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Simultaneous Cabin and Ambient Ozone Measurements on Two Boeing 747 Airplanes Volume II – January to October 1978

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PREFACE

This report contains part of the data, either obtained by the Global Air Sampling Program (GASP) or analyzed from existing ozonesonde measurements since the publication of Federal Aviation Administration (FAA) Report Number FAA-EE-79-05, "Simultaneous Cabin and Ambient Ozone Measurements on Two Boeing 747 Airplanes: Volume 1" in July 1979.

The FAA has published Advisory Circular 120-38, "Transport Category Airplanes Cabin Ozone Concentrations" dated October 10, 1980. (Copies of this advisory circular may be obtained free of charge from the United States Department of Transportation, Publications Section M-443.1, Washington, D.C. 20590.) In this advisory circular, examples are presented for acceptable (but not the only) means for an air carrier to demonstrate compliance with the maximum permissible cabin ozone concentrations established by Section 121.578 of the Federal Aviation Regulations (FAR). In paragraph 6 and Appendix 2 of the advisory circular, it is stated that any ozone data set used to show compliance must have, as a minimum, a resolution on a monthly basis of 2000 feet in altitude and 5° in latitude.

The data in this report have not been statistically compared with those published in the FAA Report Number FAA-EQ-78-03, "Guidelines for Flight Planning During Periods of High Ozone Occurrence," to determine if the two are comparable. Hence, use of the data tabulated in this report, to show compliance with Section 121.578 of the FAR, is not acceptable.

Since the data sets have been complied, however, the FAA would like to disseminate them at this time as information to the scientific community and other interested groups.

John E. Wesler
Director of Environment and Energy

SIMULTANEOUS CABIN AND AMBIENT OZONE MEASUREMENTS ON TWO BOEING 747 AIRPLANES. VOLUME II - JANUARY TO OCTOBER 1978

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INTRODUCTION

Measurements of ozone concentration in the cabins of airline operated Boeing 747SP and 747-100 airliners are tabulated and plotted along with simultaneous measurements of ambient atmospheric ozone concentrations when available. The possibility of high concentrations of ozone in the cabins of commercial aircraft is of concern to both flight crews and passengers as well as industry and government organizations. Certain physical discomfort experienced on some flights has been attributed to high concentrations of ozone entering the cabin from the outside. Regulatory actions taken by the FAA in response to this problem are given by references 1 to 4, and medical aspects of the problems are discussed in reference 5.

The simultaneous measurement of inside and outside ozone levels is a necessary step in determining the percentage destruction of ozone in the aircraft pressurization-ventilation system which must be known to define the need and design requirements for cabin ozone removal devices and systems. The relation between in-the-cabin and outside ozone levels is also required to estimate the statistical probability of encountering high ozone levels in the cabin from available climatological data on atmospheric ozone (see ref. 4).

At the time that this problem first attracted public attention in the winter of 1976-77, the NASA Global Atmospheric Sampling Program (GASP) was obtaining measurements of atmospheric trace constituents, including ozone, from automated sampling systems on board four Boeing 747 airliners in routine commercial service (refs. 6 and 7). Two of these airplanes were equipped, in March 1977, for measurement of cabin ozone in addition to ambient ozone. A 747-100 airliner (N4711U) operated by United Airlines obtained ozone data over the contiguous United States and to Hawaii, and a 747SP aircraft (N533PA) of Pan American World Airways acquired data on many international routes. Analyses of cabin and ambient (atmospheric) ozone measurements from GASP equipped 747 airliners have been reported in references 8 to 15.

All GASP cabin and simultaneous cabin and ambient ozone data are plotted and tabulated in this series of reports to permit a detailed evaluation of cabin ozone, including frequency, magnitude, and location, on two B747 airplanes during routine operations on certain flight routes. The ambient data also contribute to the statistical data base of atmospheric ozone levels. A complete tabulation of GASP cabin ozone data from March to December 1977 is given in "Simultaneous Cabin and Ambient Ozone Measurements on Two Boeing 747 Airplanes: Volume I" (ref. 16). This report (Volume II) presents all the GASP cabin ozone data collected from January to early October 1978.

Data collected from October 1978 to June 1979, when the last GASP system was deactivated, will be published in a subsequent volume in this series.

MEASUREMENT SYSTEM

Location of sample air inlets. - The points where ozone was measured outside and inside the 747 cabin are shown in figures 1 and 2. Air from outside the aircraft was sampled by a special external probe extending beyond the boundary layer near the nose of the aircraft. Air flowed in a 2.54-cm-diam tube from the probe to the ozone instrument and associated equipment mounted on a special rack below the passenger deck and adjacent to the nose gear wheel well. Air from inside the aircraft was sampled at only one point in the cabin. Air was drawn from a 0.62-cm-diam port about 1.5 m above the floor in the right outside wall of the staircase to the upper deck (left side of the right aisle). A Teflon ring attached to the wall extended the inlet to the port about 0.62 cm from the wall surface (detail in fig. 2). This minimized drawing air from along the wall surface into the sample since ozone can be destroyed by contact with surfaces. About 6 m of 0.62-cm-diam Teflon-coated tubing was used between this port and the ozone analyzer in the GASP rack. The tubing was cleaned and found to cause negligible loss of ozone.

Ambient air sample pressurization. - For the ambient measurement a diaphragm pump was used to increase the low-pressure air at altitude to 1 atm pressure. A pressure regulation system (ref. 17) held the inlet pressure to the instruments constant at 1±0.007 atm at altitudes up to 13.8 km with a flow rate of 14 liters/min. Pressurization resulted in increased instrument sensitivity and prevented cabin air from leaking into the sample lines.

Instrument type. - Ozone was measured on GASP-equipped aircraft by commercially available ultraviolet absorption photometers (Dasibi Environmental Corp.) modified and repackaged to operate in the airborne environment (ref. 18). The instrument reads continuously, updating every 10 sec. Its range is from 0.003 to 20 ppmv (parts per million by volume). Modifications to the commercial-type instrument for use in the fully automated GASP system included: (1) manual control mode switch replaced with logic circuits activated by the preprogrammed GASP onboard computer, (2) visual display replaced with an output shift register for digital recording of the airborne data, (3) circuit added to provide instrument identification, and (4) output logic modified to read out a negative zero offset not available in the original instrument.

In-flight checks and calibration. - Operational procedures were set up to insure the integrity of the data. These included in-flight instrument health checks, instrument calibration techniques, measurement of ozone loss in the GASP air sample inlet line and pressurization system, and periodic instrument maintenance.

In-flight instrument checks, recorded with the data, monitored the instrument zero, span, and frequencies of the two electronic counters used to measure the ozone concentration. These checks were performed once each hour. Zero gas was provided for the instrument zero by directing the air sample, at the proper time, through an ozone scrubber in the inlet line.

All flight instruments were calibrated before installation in the aircraft and periodically thereafter using a secondary transfer standard. This standard is a laboratory-type ultraviolet photometer which was initially calibrated using a 1 percent, neutral-buffered potassium iodide (KI) method. Later in the GASP program, the standard was calibrated at the Jet Propulsion Laboratory (JPL). This calibration is traceable to the JPL 5-meter UV photometer described in reference 19. The KI calibration was found to be 9 percent higher than the UV photometer calibration. Thus, all published GASP ozone data are 9 percent high compared with the JPL calibrations. This is a systematic difference and can be easily corrected for if the KI method is determined incorrect and other methods such as the UV photometer is adopted as the standard.

The acceptability criterion which was adopted for GASP ozone data required that the recalibration of an instrument after its removal from the aircraft be within 10 percent of the standard instrument. Data from instruments which had recalibrations near or beyond this limit are identified with tags in the GASP data files (see ref. 20) and in the tabulations herein.

The reliability of the instruments was determined from flight and ground checks and the laboratory recalibrations following installation in the aircraft. Most component failures could be detected from the instrument output or ground checks. One type of failure (deterioration of the ozone scrubber within the instrument) was detected only at the time of recalibration and is believed to be the cause of the low recalibrations cited above. Excluding failures, the stability of the 10 flight instruments during 1 year of operation (seven calibrations per instrument) was within 1 percent (ref. 18).

A concern in the ambient ozone measurement is the destruction of ozone in the lines from the stainless-steel inlet probe to the instrument and in the pump that raises the sample pressure to 1 atm. The lines are Teflon, and the pump is a Teflon coated diaphragm type. Ozone destruction through the aircraft installed system was measured under conditions simulating operation in flight. An ozone destruction test package was developed by NASA to periodically determine this loss on the aircraft. Initial test data from different systems indicated ozone destruction from 13 to 19 percent (1975 to mid-1977). This was later (mid-1977 to 1979) reduced to less than 6 percent with a random error of ±2 percent using improved materials in the pump diaphragm. The random error of the ambient ozone measuring system was found to be less than 4 percent of reading or 0.003 ppmv, whichever is greater. A complete description of the ozone measurement system is given in reference 18.

It has been observed that smoke ingested into the ozone instrument produces transitory fluctuations in the readings, either positive or negative. This effect may account for some of the spikes that appear occasionally in the ozone data recorded in the cabin.

Data acquisition system. - Ozone data (atmospheric and in-cabin) were taken with the existing GASP data acquisition and control system. All major components of this system were airborne units used by many airlines in normal flight data recording systems. The preprogrammed processor for automatic system control (DMCU) was a modified Data Management Unit. This unit also provided certain data-acquisition functions. Additional data acquisition

was handled by a standard flight data acquisition unit (FDAU). All data were recorded on a digital cassette recorder of the same type (Digital Aids Recorder (DAR)) used by the airlines for flight recording. The GASP system was autonomous having dedicated units for all data acquisition and system control functions.

Instruments were turned on during aircraft preflight preparations. The computer-processor assumed control just before takeoff. A standby condition was held until a signal was received by the processor from the altimeter to set up the system for sampling. This was set at 6.1 km (FL200). A basic 60-min sampling cycle was constructed by alternating 5-min air sampling and 5-min calibration modes. Thus, there were six sample readings and six different calibrations in each cycle. All data were recorded during a 16-second period at the end of each 5-min air sampling or calibration mode. The ozone instrument required only four calibrations during each 1 hour cycle. Thus, ozone measurements were taken every 10 min during the first 40 min of the cycle and every 5 min during the remaining 20 min. The time, position of the aircraft, altitude, speed, heading, winds, and air temperature were also recorded to provide spatial and temporal identification for each ozone measurement. Before landing, the system was returned to a standby condition.

Data reduction procedure. - The tape recorder cassettes were removed from the aircraft about every 2 weeks. Data on the cassettes were transcribed onto computer compatible tape, which was shipped to the NASA Lewis Research Center. This tape was initially processed to provide a direct printout of the flight data, dividing the continuous data record into flight segments based on flight origin and destination (see table I). Further data processing included the ozone system calibration correction, deletion of questionable and redundant data, and a retranscription to a final format. A complete discussion of data reduction specifications is given in reference 20.

PRESENTATION OF DATA

All GASP data, including the cabin and ambient ozone data presented herein, are available to the public on magnetic computer tape from the National Climatic Center, Federal Building, Asheville, North Carolina 28801. In addition to providing compact storage of a large amount of data, the availability of the data on computer tape facilitates data analysis and alternate presentations which would be awkward if not impossible from the hard copy.

The data tabulated and plotted here are from GASP tapes VL0015, VL0016, VL0017, and VL0018. These tapes include all cabin ozone data obtained by GASP equipped aircraft from January 6 to October 6, 1978. Flight routes and dates, instrumentation, data processing procedures, and data tape specifications are reported in reference 20.

Summary tabulations. - A data summary, arranged chronologically by flight for all flights with cabin and/or ambient ozone from January to October 1978, is given in appendixes A and B for airplanes N533PA (B747SP) and N4711U (B747-100), respectively. The parameters presented were selected based on the requirements of reference 3, and include for each flight, the

departure date, route (see table I for code), mean flight level, data time interval, and cabin and ambient ozone data. All ozone levels are expressed as ppmv.

The number of cabin ozone measurements for each flight is given in the column headed ND following the departure date, route, and mean flight level. The elapsed time from the first to the last cabin ozone measurement for each flight is given in the TOTAL time column. If no cabin ozone measurements were made during a given flight, the elapsed time from the first to the last ambient ozone measurement is given as the TOTAL time. Since the GASP system did not normally obtain data at altitudes below FL 200, the TOTAL times here are less than the segment time specified in reference 3. The time during which the cabin ozone level exceeded 0.1-ppmv sea-level equivalent[1] (ppmv SLE) is given in the $\geq$0.1E column; and the time during which the cabin ozone level exceeded 0.25 ppmv SLE is given in the $\geq$0.25E column.

The mean (MEAN) and mean plus 1 standard deviation (M + SD) cabin ozone levels are time-weighted averages over the time period given by TOTAL. The maximum observed cabin ozone level in each flight is also listed. The maximum time-weighted average cabin ozone level during any 3-hr interval in the flight is given under 3HR. If TOTAL is less than 3 hr, then the 3HR column is left blank.

Next, the number of data points, time-weighted mean and mean plus 1 standard deviation, and maximum values of ambient ozone data are given for each flight. For measurement periods in which both cabin and ambient ozone data are available, and in which the ambient level is greater than 0.1 ppmv, the mean ratio of these data points, as well as their standard deviations are given following the ambient ozone data for each flight.

The final column in the Summary Tabulations is used to identify ventilation system modifications and changed operating procedures which occurred during the period for which data are reported. Since a charcoal filter system was installed on N533PA on August 6, 1977, and remained in place throughout the flight period reported herein, this column contains an 'F' for all flights in appendix A. There were no air conditioning system modifications on N4711U during the period of the data reported herein.

Three periods of ozone data (parts of tapes VL0015, 16, and 18) originated from instruments which were found to be reading low when recalibrated after removal from the airplane. The airplane, measurement, installation period, and recalibration results are given in table II. The cause of these failures is thought to be gradual degradation of the ozone scrubber within the instrument. Consistent with this suspected failure mode, data in the appendixes A and B tabulations have been corrected using a parabolic correction with time assuming that (1) the instrument was correctly calibrated

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[1]The statement of the rule in units of sea-level-equivalent ppmv (ppmv SLE) is equivalent to specifying limits on ozone density (e.g., $\mu g/m^3$). For a constant ozone density, the allowable true volume fraction (e.g., ppmv) in the cabin will vary inversely with cabin pressure (see refs. 3 and 4).

when installed, (2) the instrument had not yet begun to fail when installed, and (3) the instrument was reading low by the amount in table II when removed from the airplane. This correction can be expressed mathematically as

$$O_{3corr} = O_{3meas}\left(1 + \left(\frac{day - day\ on}{day\ off - day\ on}\right)^2 \left(\frac{RECAL}{100 - RECAL}\right)\right)$$

where

O_{3meas}	is the level as reported and tagged on GASP data tapes
day	is the day of year
day on	is the day of year the instrument was installed
day off	is the day of year the instrument was removed
RECAL	is the percentage that the instrument was reading below the standard when recalibrated (see table II).

The correction applied for the measurement periods in table II was greater than 11 percent (measurement more than 10 percent low) only for cabin ozone data from N533PA from August 9th to September 29th, and for ambient ozone data from N4711U from September 8th to 20th.

Flight data plots. - Plots of GASP ozone data for all flights with simultaneous measurements of cabin and ambient ozone are organized chronologically in appendixes C and D for N533PA and N4711U, respectively. In the plots for each flight, the upper panel gives the altitude (boxes) and latitude (crosses), the center panel gives the ambient (boxes) and cabin (crosses) ozone levels, and the lower panel gives the ozone ratio (cabin divided by ambient). Data are plotted at the multiple of 5 min nearest to their actual elapsed time. Data points are not connected if the time interval between points is greater than 10 min. For ambient ozone less than 0.1 ppmv, the corresponding ratios are not plotted.

Microfiche flight data tabulations. - Cabin and ambient ozone data for all flights on which cabin ozone measurements are available are tabulated on the microfiche included herein as appendix E. These, of course, include data for those flights plotted in appendixes C and D. In addition to the tables, line printer plots of the cabin and ambient ozone data follow the tabulation for each flight.

An example of the microfiche tabulation is given in table III. Each table has a heading where the departure and arrival airports are identified by the standard three-letter airport code (table I), and the departure date and the aircraft number are given. The remainder of the heading is self-explanatory, although special cases arise: if no ambient ozone values were observed on a flight, then asterisks are entered for the maximum ambient ozone value and for the maximum ratio value; if no ambient ozone value greater than 0.1 ppmv was observed, then asterisks are also entered for the maximum ratio value.

In the tables ETIM is the elapsed time after the time of the first data record on the flight. RATIO is the cabin ozone amount divided by the ambient ozone amount. If any variable is missing, its position in the table is left blank. Observations are entered at minimum time intervals of 5 min (during the data processing, any observation made less than 5 min after the most

recent acceptable observation was disregarded). If two or more observations were made during the same GMT minute, they were averaged, and an "A" is entered after the GMT. If the GMT was missing for an observation, then for all following observations on the flight, the elapsed time between observations was computed using the aircraft speed and the distance traveled between the geographic coordinates of the data points. The GMT of each observation was then estimated by adding the computed elapsed time to the GMT of the previous observation. In these cases an "M" is entered in the table after the GMT, unless two or more observations had the same estimated GMT, in which case the "A" tag takes precedence.

During the period of data reported herein, a charcoal filter system was in use on aircraft N533PA. These cabin ozone measurements are identified by an "F" in the tables to the right of the ratio column. Data from instruments found to be reading low when recalibrated after removal from the airplane (see table II) are presented without correction in appendixes C to E and are identified by an "L" or an "H" tag in the ratio tag column in the appendix E tabulations. An "L" indicates that the measured cabin ozone level may be too low, and thus the ratio may be low; and similarly, an "H" indicates that the measured ambient ozone level may be too low, and thus the ratio may be too high. The "L" and "H" tags take precedence over all other ratio tags (" ", "B", and "F").

The header on each microfiche identifies the GASP tape and airplane from which the data originated. The corresponding dates of data acquisition are given in table IV. For completeness, microfiche for tapes VL0009, 10, 12, and 14 (ref. 16) are included here, in addition to those for tapes VL0015-18.

Statistical results. - Table V summarizes the ozone retention ratio data to October 1978 for both GASP equipped airliners. As we are concerned only about those times when ozone may be a problem, only those observations when the ambient ozone amount was above 0.1 ppmv were used when compiling table V. Because of ventilation system modifications or changed operating procedures, the data from the 747SP are divided among the following categories: (1) unmodified, (2) unmodified with 15th-stage (high temperature) compressor bleed, (3) increased air recirculation, (4) increased air recirculation with 15th-stage compressor bleed, and (5) charcoal filter. A measure of the variability of the retention ratio is given by its standard deviation, which has been included in the table along with the correlation coefficient between the cabin and ambient ozone levels. The values reported in categories (1), (2), and (3) for the SP are the same as given in references 14 and 16 and are included here for completeness. There may be factors other than those listed that influence the retention ratio from flight to flight or even within a flight, such as ambient level (ref. 15), load factor, or flight duration (ref. 9), but these are not considered separately here.

CONCLUDING REMARKS

Measurement of ozone concentrations both outside and inside the cabin of airline operated Boeing 747SP and 747-100 airliners are tabulated and plotted. In addition, summary tabulations are provided for all flights with ozone data on both aircraft, and statistical results from the simultaneous measurements are presented. Data were taken at 5- or 10-min intervals by automated

instrumentation used in the NASA Global Atmospheric Sampling Program (GASP). All cabin ozone data obtained by GASP-equipped airliners N533PA and N4711U from January to early October 1978 are presented in this volume.

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TABLE I. - AIRPORT/CITY CODES

AMS	Amsterdam, The Netherlands	HND	Tokyo, Japan
AKL	Auckland, New Zealand	HNL	Honolulu, Hawaii
BAH	Bahrain, Saudi Aradia	ITO	Hilo, Hawaii
BKK	Bangkok, Thailand	JFK	New York, New York
BOM	Bombay, India	LAS	Las Vegas, Nevada
BOS	Boston, Massachusetts	LAX	Los Angeles, California
BRU	Brussels, Belgium	LHR	London, England
CPH	Copenhagen, Denmark	MEL	Melbourne, Australia
CPT	Cape Town, South Africa	NAN	Nandi, Fiji
CTS	Sapporo, Japan	NRT	Tokyo, Japan
DEN	Denver, Colorado	ORD	Chicago, Illinois
DFW	Dallas/Ft. Worth, Texas	PPG	Pago Pago, Samoa
DTW	Detroit, Michigan	PPT	Papeete, Tahiti
EZE	Buenos Aires, Argentina	SEA	Seattle, Washington
FAI	Fairbanks, Alaska	SIN	Singapore, Malaysia
GIG	Rio de Janeiro, Brazil	SYD	Sydney, Australia
HKG	Hong Kong	YYZ	Toronto, Canada

TABLE II. - OZONE INSTRUMENTS RECALIBRATION RESULTS

Airplane	Instrument	Measurement	Dates (Day of Year)	Recalibration, percent low	Tape	File	Flights
N533PA	22	Cabin	6/1/78 - 9/29/78 (152 - 272)	25	VL0015	3	50 - end
					VL0016	1	All
					VL0016	2	1 - 89
N4711U	2	Ambient	6/23/78 - 9/20/78 (174 - 263)	13	V10018	1	All
					VL0018	2	1 - 32
N4711U	23	Cabin	9/20/78 - 12/15/78 (263 - 349)	8	VL0018	2	33 - end

TABLE III. - EXAMPLE OF CABIN AND AMBIENT OZONE FLIGHT DATA LISTING

SEO TO HKG DEPARTURE: 1 FEB 78 AIRCRAFT: PANAM -N533PA

MAXIMUM VALUES: AMBIENT OZONE=1.159 CABIN OZONE=.132 RATIO (LIMITED TO AMB. OZONE ABOVE 0.1)=.46 TOTAL OBS IN CABIN: 104
DATA SOURCE: GASP TAPE VL015. FILE 1. FLT 40 AN "A" AFTER THE GMT BELOW DENOTES MORE THAN ONE OBSERVATION WAS AVERAGED

MO/DA/YR	GMT	ETIM HR:MN	FL	LAT	LONG	TEMP (C)	OZONE CABIN	(PPMV) AMB.	RATIO	MO/DA/YR	GMT	ETIM HR:MN	FL	LAT	LONG	TEMP (C)	OZONE CABIN	(PPMV) AMB.	RATIO
2/ 1/78	2308	0:10	322	39.24N	123.87W	-55.	.000	.054	F	2/ 2/78	0453	5:55	390	53.75N	173.11E	-50.	.067		F
2/ 1/78	2318	0:20	351	39.94N	124.93W	-61.		.086	F	2/ 2/78	0458	6:00	390	53.66N	171.95E	-48.	.085	1.032	.08 F
2/ 1/78	2328	0:30	350	40.66N	126.05W	-61.	.000	.089	F	2/ 2/78	0503	6:05	390	53.57N	170.79E	-47.	.051	1.035	.05 F
2/ 1/78	2333	0:35	350	41.01N	126.61W	-60.	.000	.083	F	2/ 2/78	0508	6:10	390	53.41N	169.68E	-47.	.074		F
2/ 1/78	2343	0:45	350	41.70N	127.74W	-61.	.013	.066	F	2/ 2/78	0518	6:20	390	52.81N	167.67E	-45.	.069	1.048	.07 F
2/ 1/78	2348	0:50	350	42.03N	128.31W	-60.		.059	F	2/ 2/78	0528	6:30	390	52.18N	165.75E	-45.	.065	.927	.07 F
2/ 1/78	2353	0:55	350	42.37N	128.88W	-60.	.060	.067	F	2/ 2/78	0533	6:35	390	51.86N	164.81E	-43.	.063	.958	7 F
2/ 1/78	2358	1:00	350	42.70N	129.47W	-60.		.062	F	2/ 2/78	0543	6:45	390	51.19N	162.97E	-44.	.073	1.087	.07 F
2/ 2/78	0003	1:05	350	43.04N	130.06W	-61.	.000	.063	F	2/ 2/78	0553	6:55	390	50.48N	161.17E	-44.	.069	.871	.08 F
2/ 2/78	0013	1:15	350	43.73N	131.26W	-61.	.033	.057	F	2/ 2/78	0558	7:00	390	50.12N	160.29E	-44.	.076	.820	.09 F
2/ 2/78	0023	1:25	350	44.43N	132.51W	-61.	.000	.056	F	2/ 2/78	0603	7:05	390	49.73N	159.45E	-44.	.063	.891	.07 F
2/ 2/78	0033	1:35	350	45.12N	133.81W	-61.	.008	.062	F	2/ 2/78	0608	7:10	390	49.31N	158.64E	-42.	.076	1.159	.07 F
2/ 2/78	0043	1:45	350	45.79N	135.15W	-60.	.003	.083	F	2/ 2/78	0613	7:15	390	48.89N	157.85E	-42.	.085	1.050	.08 F
2/ 2/78	0048	1:50	350	46.13N	135.84W	-59.	.054	.095	F	2/ 2/78	0623	7:25	390	48.05N	156.33E	-41.	.069	1.001	.07 F
2/ 2/78	0053	1:55	350	46.47N	136.54W	-59.	.065	.142	.46 F	2/ 2/78	0633	7:35	390	47.20N	154.88E	-43.	.132	.863	.15 F
2/ 2/78	0058	2:00	350	46.80N	137.25W	-60.	.005	.123	.04 F	2/ 2/78	0643	7:45	390	46.34N	153.47E	-43.	.062	.784	.08 F
2/ 2/78	0103	2:05	350	47.13N	137.99W	-58.	.009	.141	.06 F	2/ 2/78	0653	7:55	391	45.47N	152.14E	-42.	.091	.771	.12 F
2/ 2/78	0113	2:15	350	47.77N	139.46W	-58.	.002	.179	.01 F	2/ 2/78	0658	8:00	390	45.03N	151.48E	-43.	.114	1.043	.11 F
2/ 2/78	0123	2:25	350	48.38N	141.07W	-57.	.009	.202	.04 F	2/ 2/78	0703	8:05	390	44.58N	150.83E	-42.	.108	1.034	.10 F
2/ 2/78	0133	2:35	350	48.95N	142.76W	-61.	.009	.122	.07 F	2/ 2/78	0708	8:10	390	44.13N	150.18E	-42.	.127	1.153	.11 F
2/ 2/78	0143	2:45	350	49.50N	144.49W	-61.	.010	.099	F	2/ 2/78	0713	8:15	390	43.72N	149.49E	-42.	.055	.751	.07 F
2/ 2/78	0148	2:50	350	49.77N	145.39W	-62.	.007	.075	F	2/ 2/78	0723	8:25	390	42.96N	148.16E	-41.	.070	.979	.07 F
2/ 2/78	0153	2:55	350	50.04N	146.32W	-62.	.084	.060	F	2/ 2/78	0733	8:35	390	42.19N	146.88E	-40.	.030	.837	.04 F
2/ 2/78	0158	3:00	350	50.31N	147.29W	-62.	.010	.055	F	2/ 2/78	0743	8:45	390	41.43N	145.64E	-41.	.058	.788	.07 F
2/ 2/78	0203	3:05	350	50.57N	148.28W	-63.	.005	.047	F	2/ 2/78	0753	8:55	390	40.66N	144.46E	-37.	.051	.489	.10 F
2/ 2/78	0213	3:15	350	51.07N	150.30W	-63.	.021	.045	F	2/ 2/78	0758	9:00	390	40.26N	143.87E	-40.	.042	.809	.05 F
2/ 2/78	0223	3:25	350	51.57N	152.38W	-63.	.058	.079	F	2/ 2/78	0803	9:05	390	39.87N	143.28E	-42.	.041	.630	.07 F
2/ 2/78	0233	3:35	370	52.03N	154.51W	-65.	.043	.119	.36 F	2/ 2/78	0808	9:10	390	39.49N	142.74E	-42.	.057	.904	.06 F
2/ 2/78	0243	3:45	370	52.44N	156.65W	-66.	.034	.098	F	2/ 2/78	0813	9:15	391	39.11N	142.20E	-42.	.048	.774	.06 F
2/ 2/78	0248	3:50	370	52.63N	157.72W	-67.	.039	.086	F	2/ 2/78	0823	9:25	411	38.37N	141.17E	-48.	.057	.838	.07 F
2/ 2/78	0253	3:55	370	52.82N	158.82W	-67.	.032	.079	F	2/ 2/78	0833	9:35	410	38.11N	139.87E	-46.	.056	.826	.07 F
2/ 2/78	0258	4:00	370	52.99N	159.94W	-66.	.040	.105	.38 F	2/ 2/78	0843	9:45	411	37.66N	138.59E	-44.	.082	.934	.09 F
2/ 2/78	0303	4:05	370	53.15N	161.08W	-66.	.040	.104	.38 F	2/ 2/78	0853	9:55	410	37.01N	137.45E	-45.	.050	.557	.09 F
2/ 2/78	0313	4:15	370	53.44N	163.39W	-63.	.006	.167	.04 F	2/ 2/78	0858	10:00	410	36.68N	136.89E	-45.	.058	.557	.10 F
2/ 2/78	0323	4:25	370	53.68N	165.69W	-61.	.024	.275	.09 F	2/ 2/78	0908	10:10	410	36.21N	135.73E	-45.	.047	.460	.10 F
2/ 2/78	0333	4:35	370	53.87N	168.03W	-63.	.011	.261	.04 F	2/ 2/78	0913	10:15	410	36.05N	135.13E	-45.	.031	.445	.07 F
2/ 2/78	0343	4:45	370	54.02N	170.45W	-55.	.014	.333	.04 F	2/ 2/78	0923	10:25	411	35.71N	133.95E	-45.	.011	.422	.03 F
2/ 2/78	0348	4:50	390	54.06N	171.66W	-53.	.009	.527	.02 F	2/ 2/78	0943	10:45	410	34.25N	132.30E	-46.	.020	.154	.13 F
2/ 2/78	0353	4:55	390	54.08N	172.85W	-53.	.005	.454	.01 F	2/ 2/78	0953	10:55	410	33.31N	131.65E	-49.	.021	.090	F
2/ 2/78	0358	5:00	390	54.10N	174.03W	-53.	.002	.486	.00 F	2/ 2/78	0958	11:00	411	32.84N	131.34E	-48.	.019	.084	F
2/ 2/78	0403	5:05	390	54.10N	175.22W	-53.	.004	.436	.01 F	2/ 2/78	1003	11:05	411	32.34N	131.01E	-51.	.030	.082	F
2/ 2/78	0413	5:15	390	54.07N	177.62W	-54.	.022	.644	.03 F	2/ 2/78	1008	11:10	410	31.86N	130.69E	-52.	.017	.062	F
2/ 2/78	0423A	5:25	390	54.00N	179.98W	-53.	.021	.419	.05 F	2/ 2/78	1013	11:15	410	31.53N	130.24E	-51.	.030	.050	F
2/ 2/78	0433	5:35	390	53.96N	177.68W	-54.	.028	.474	.06 F	2/ 2/78	1023	11:25	428	30.91N	129.32E	-56.	.067	.048	F
2/ 2/78	0443	5:45	390	53.87N	175.37E	-50.	.040	.865	.05 F	2/ 2/78	1033	11:35	430	30.28N	128.43E	-57.	.035	.044	F
2/ 2/78	0448	5:50	390	53.81N	174.24E	-51.	.052	.971	.05 F	2/ 2/78	1043	11:45	430	29.65N	127.54E	-59.	.009	.029	F
2/ 2/78	1053	11:55	430	29.01N	126.64E	-61.	.010	.027	F	2/ 2/78	1143	12:45	430	25.44N	121.85E	-60.	.001	.023	F
2/ 2/78	1058	12:00	430	28.68N	126.17E	-61.	.003	.032	F	2/ 2/78	1153	12:55	430	24.69N	120.93E	-61.	.005	.024	F
2/ 2/78	1103	12:05	430	28.33N	125.70E	-58.	.014	.040	F	2/ 2/78	1158	13:00	430	24.30N	120.48E	-62.	.009	.021	F
2/ 2/78	1108	12:10	430	27.97N	125.20E	-58.	.008	.041	F	2/ 2/78	1203	13:05	430	23.91N	120.02E	-62.	.000	.019	F
2/ 2/78	1113	12:15	430	27.61N	124.72E	-57.	.003	.039	F	2/ 2/78	1208	13:10	430	23.53N	119.57E	-63.	.000	.021	F
2/ 2/78	1123	12:25	430	26.87N	123.73E	-60.	.000	.027	F	2/ 2/78	1213	13:15	430	23.22N	119.03E	-63.	.006	.023	F
2/ 2/78	1133	12:35	430	26.15N	122.77E	-61.	.000	.023	F	2/ 2/78	1223	13:25	430	22.63N	117.99E	-64.	.038	.023	F
										2/ 2/78	1233	13:35	430	22.33N	116.84E	-64.	.005	.022	F

TABLE IV. - MICROFICHE DATA PERIODS

Tape	Airplane	Dates
VL0009	N533PA	10/28 - 10/30/77
VL0010	N533PA	1/21 - 10/4/77
VL0012	N4711U	1/3 - 6/15/77
VL0014	N533PA	10/4/77 - 1/3/78
	N4711U	11/9 - 11/14/77
VL0015	N533PA	1/8 - 6/21/78
VL0016	N533PA	6/22 - 10/5/78
VL0017	N4711U	1/6 - 6/23/78
VL0018	N4711U	6/23 - 10/6/78

TABLE V. - CORRELATION BETWEEN SIMULTANEOUS CABIN AND AMBIENT OZONE MEASUREMENTS FROM GASP DATA FROM MARCH 1977 TO OCTOBER 1978

Airplane	Added technique for destroying ozone	ND	Cabin to ambient ozone ratio (ambient >0.1)		Correlation coefficient
			Mean	Standard deviation	
747SP (N533PA)	(1) Unmodified 5/12 - 6/4/77	[a]527	0.825	0.208	0.87
	(2) Unmodified with 15th-stage compressor bleed 5/12 - 6/4/77	[a]123	.268	.132	.51
	(3) Modified air recirculation 6/4 - 8/6/77	1995	.552	.191	.81
	(4) Modified air recirculation with 15th-stage bleed 6/4 - 8/6/77	972	.221	.109	.42
	(5) Charcoal filter 8/6/77 - 10/4/78	12366	.081	.086	.71
747-100 (N4711U)	None 3/30/77 - 10/6/78	4556	0.381	0.185	0.85

[a]Data from before 5/12/77 are not included because identification of periods of high temperature bleed use was not available on GASP data tapes.

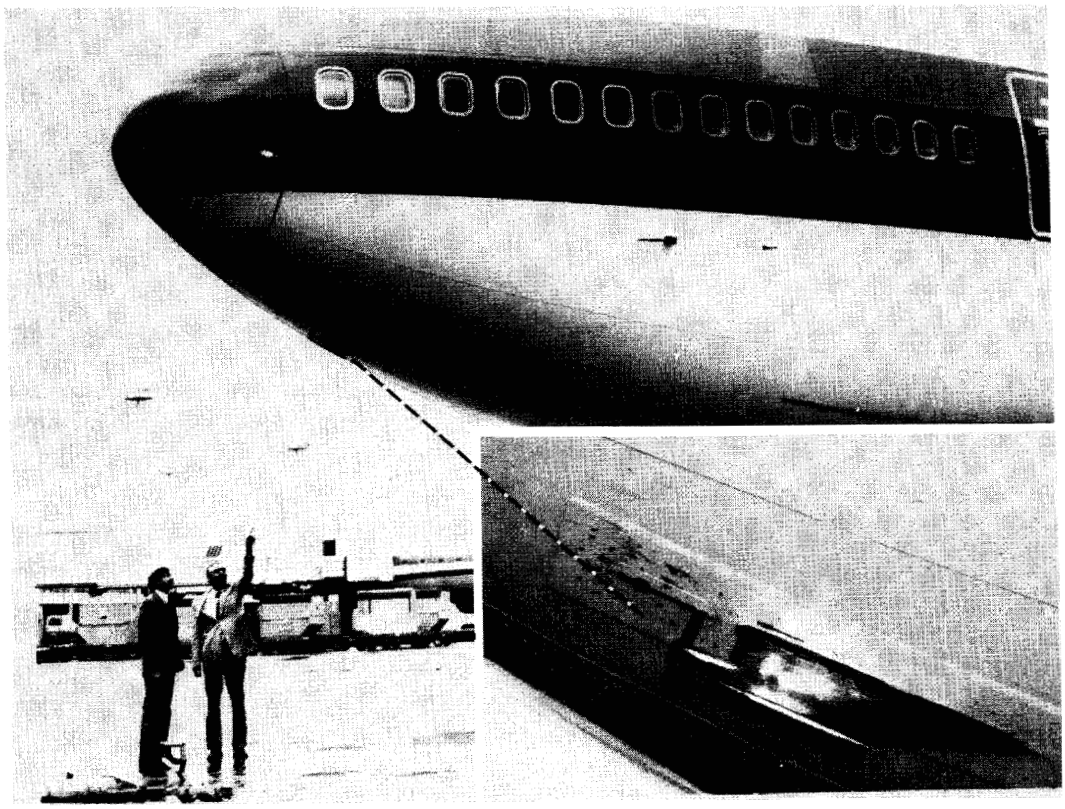

Figure 1. - Air sample inlet probes mounted on 747 airliner equipped for GASP.

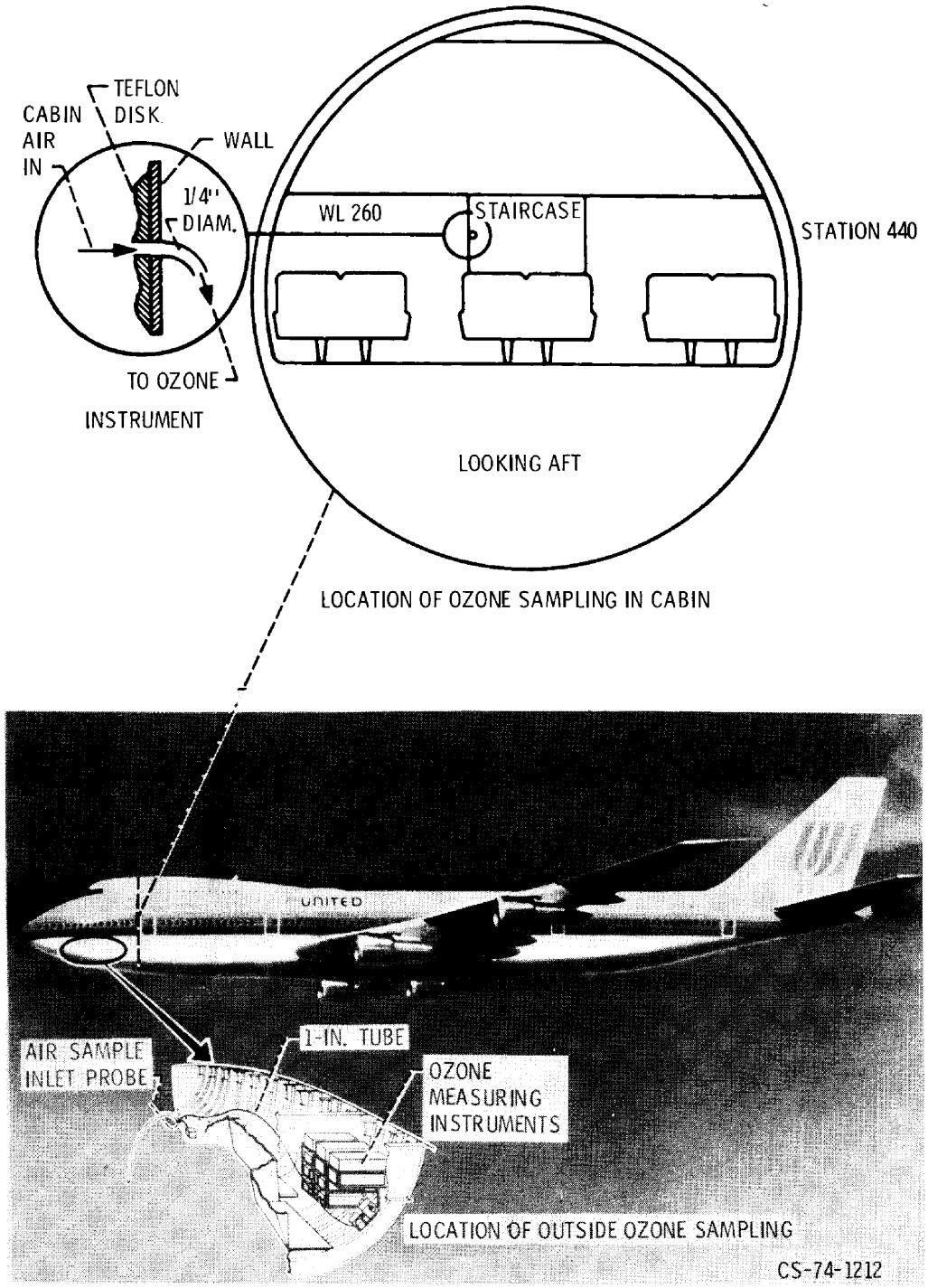

Figure 2. - Ozone measurement locations on B747 airliner.

APPENDIX A - SUMMARY TABULATIONS OF GASP OZONE DATA

FOR N533PA (BOEING 747SP); 1/8/78-10/5/78

GASP CABIN AND AMBIENT OZONE DATA SUMMARY

AIRCRAFT: N533PA (B747SP)

TAPE VL0015, FILE 1

DATE	ROUTE	FL	CABIN OZONE								AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)			
				HOURS:MIN			PPMV					PPMV						
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD	
1/ 8/78	JFK-HND	377.	91	12:06	:10		.030	.054	.150	.045	0	---	---	---	0	---	---	F
1/ 9/78	HND-LAX	385.	62	8:08			.012	.021	.040	.015	0	---	---	---	0	---	---	F
1/ 9/78	LAX-HND	378.	72	9:30			.041	.069	.105	.065	0	---	---	---	0	---	---	F
1/10/78	HND-JFK	370.	83	11:15			.039	.065	.093	.071	0	---	---	---	0	---	---	F
1/11/78	JFK-HND	384.	99	13:00	:10		.048	.073	.145	.074	0	---	---	---	0	---	---	F
1/12/78	HND-LAX	405.	62	8:11			.047	.068	.116	.066	0	---	---	---	0	---	---	F
1/12/78	LAX-HND	398.	66	9:45	:10		.057	.096	.245	.085	0	---	---	---	0	---	---	F
1/13/78	HND-JFK	375.	72	11:12	:06		.057	.087	.264	.077	0	---	---	---	0	---	---	F
1/14/78	JFK-HND	373.	72	10:00	:55		.067	.116	.252	.085	0	---	---	---	0	---	---	F
1/16/78	HND-JFK	386.	63	10:55	1:05		.046	.084	.152	.066	0	---	---	---	0	---	---	F
1/18/78	HND-LAX	398.	41	8:08			.039	.059	.088	.051	0	---	---	---	0	---	---	F
1/18/78	SFO-HKG	378.	65	13:42	1:35		.067	.119	.299	.114	0	---	---	---	0	---	---	F
1/19/78	HKG-SIN	413.	15	2:55	:05		.017	.038	.166	---	0	---	---	---	0	---	---	F
1/20/78	SIN-HKG	393.	18	2:50			.012	.021	.031	---	0	---	---	---	0	---	---	F
1/20/78	HKG-SFO	378.	53	10:14	:55	:20	.079	.320	1.803	.228	0	---	---	---	0	---	---	F
1/20/78	SFO-HKG	386.	72	13:54	1:45		.061	.109	.206	.099	0	---	---	---	0	---	---	F
1/21/78	HKG-SIN	365.	15	2:55	1:15	:05	.092	.203	.454	---	0	---	---	---	0	---	---	F
1/22/78	SIN-HKG	384.	6	2:10			.015	.025	.027	---	0	---	---	---	0	---	---	F
1/22/78	HKG-SFO	370.	61	10:07	:10		.029	.055	1.670	.037	0	---	---	---	0	---	---	F
1/22/78	SFO-HKG	385.	66	13:45	:20		.040	.073	.145	.074	0	---	---	---	0	---	---	F
1/23/78	HKG-SIN	418.	11	2:50			.026	.053	.134	---	0	---	---	---	0	---	---	F
1/24/78	SIN-HKG	396.	11	2:30	1:05		.083	.165	.225	---	0	---	---	---	0	---	---	F
1/24/78	HKG-SFO	378.	40	9:25	:30		.038	.088	.340	.054	0	---	---	---	0	---	---	F
1/27/78	HKG-SFO	380.	0	10:20			---	---	---	---	78	.113	.224	.567	0	---	---	F
1/27/78	SFO-HKG	376.	0	13:11			---	---	---	---	103	.327	.545	.887	0	---	---	F
1/29/78	SIN-HKG	398.	0	2:40			---	---	---	---	21	.024	.030	.043	0	---	---	F
1/29/78	HKG-SFO	369.	0	10:01			---	---	---	---	78	.183	.339	.606	0	---	---	F
1/31/78	HKG-SFO	383.	0	10:04			---	---	---	---	77	.210	.398	.614	0	---	---	F
2/ 1/78	SFO-HKG	386.	105	13:25	:15		.035	.065	.132	.074	106	.389	.769	1.159	59	.089	.088	F
2/ 2/78	HKG-SIN	400.	20	2:53			.008	.019	.048	---	20	.023	.030	.035	0	---	---	F
2/ 3/78	SIN-HKG	399.	17	1:55			.003	.008	.016	---	19	.023	.030	.037	0	---	---	F
2/ 3/78	HKG-SFO	377.	66	9:52			.015	.033	.073	.031	77	.119	.273	.694	19	.117	.109	F
2/ 3/78	SFO-HKG	380.	96	12:55	:10		.037	.067	.129	.079	100	.359	.693	1.419	63	.095	.045	F
2/ 4/78	HKG-SIN	379.	21	2:45			.014	.029	.053	---	21	.034	.039	.040	0	---	---	F
2/ 5/78	SIN-HKG	392.	12	2:16			.008	.019	.031	---	0	---	---	---	0	---	---	F

GASP CABIN AND AMBIENT OZONE DATA SUMMARY

AIRCRAFT: N533PA (B747SP)

DATE	ROUTE	FL	CABIN OZONE								AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)			
				HOURS:MIN			PPMV					PPMV						
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD	
2/ 5/78	HKG-SFO	366.	64	9:30			.008	.021	.045	.008	0	---	---	---	0	---	---	F
2/ 5/78	SFO-HKG	382.	98	13:22	:10		.032	.064	.132	.074	104	.350	.612	1.058	68	.093	.047	F
2/ 6/78	HKG-SIN	413.	18	2:30			.001	.005	.013	---	0	---	---	---	0	---	---	F
2/ 7/78	SIN-HKG	406.	11	1:25			.022	.053	.102	---	0	---	---	---	0	---	---	F
2/ 7/78	HKG-SFO	374.	67	9:41	:10		.020	.056	.237	.043	77	.070	.090	.124	5	.051	.053	F
2/ 8/78	LAX-HND	389.	68	9:42	1:45		.083	.130	.175	.122	0	---	---	---	0	---	---	F
2/ 9/78	HND-JFK	362.	87	11:35	:10		.051	.081	.166	.074	0	---	---	---	0	---	---	F
2/10/78	JFK-HND	377.	94	12:25	:20		.049	.082	.239	.063	94	.510	.754	1.052	86	.092	.032	F
2/11/78	HND-JFK	374.	85	11:13			.028	.054	.086	.055	86	.397	.670	.914	67	.066	.050	F
2/12/78	JFK-HND	380.	97	12:30	:25		.049	.084	.153	.082	96	.542	.829	1.191	95	.082	.042	F
2/13/78	HND-LAX	402.	57	7:25			.018	.034	.079	.023	61	.378	.579	.821	56	.045	.042	F
2/13/78	LAX-HND	397.	75	9:48	:10		.049	.081	.173	.077	79	.618	.866	1.415	73	.076	.036	F
2/14/78	HND-JFK	376.	80	11:15			.050	.078	.104	.070	0	---	---	---	0	---	---	F
2/15/78	JFK-HND	372.	85	11:24	:05		.052	.084	.183	.086	94	.564	.812	1.148	81	.085	.034	F
2/16/78	HND-LAX	394.	44	8:00			.006	.017	.056	.014	0	---	---	---	0	---	---	F
2/16/78	LAX-HND	376.	73	10:25	2:25		.079	.137	.296	.142	0	---	---	---	0	---	---	F
2/17/78	HND-JFK	373.	64	11:03	:10		.022	.049	.157	.053	84	.467	.736	.995	63	.043	.037	F
2/18/78	JFK-CTS	363.	84	11:04			.039	.062	.109	.059	88	.560	.715	.989	84	.067	.037	F
2/19/78	CTS-HND	325.	4	:35			.052	.062	.057	---	0	---	---	---	0	---	---	F
2/19/78	HND-LAX	405.	53	7:00			.040	.078	.127	.080	55	.328	.525	.707	49	.099	.056	F
2/20/78	LAX-HND	380.	69	8:49	:30		.073	.110	.147	.096	0	---	---	---	0	---	---	F
2/20/78	HND-JFK	381.	81	10:16	:15		.063	.097	.270	.074	88	.599	.818	1.256	79	.098	.048	F
2/21/78	JFK-HND	385.	88	12:15	1:55		.084	.138	.234	.140	92	.662	.897	1.327	87	.117	.065	F
2/22/78	HND-LAX	389.	45	7:50			.018	.045	.120	.050	60	.322	.610	1.276	40	.037	.040	F
2/22/78	LAX-HND	388.	63	8:01	1:05		.080	.123	.252	.117	0	---	---	---	0	---	---	F
2/23/78	HND-JFK	388.	88	11:14	:10		.054	.082	.147	.071	0	---	---	---	0	---	---	F
2/24/78	JFK-HND	368.	92	12:01	2:20		.075	.127	.260	.114	94	.597	.852	1.116	89	.120	.067	F
2/25/78	HND-LAX	374.	46	7:44			.022	.046	.101	.039	0	---	---	---	0	---	---	F
2/25/78	LAX-HND	384.	65	8:30	1:25		.068	.125	.200	.133	75	.511	.836	1.239	64	.103	.061	F
2/26/78	HND-JFK	386.	86	10:55	2:10		.085	.126	.211	.125	88	.668	.882	1.303	85	.127	.062	F
2/27/78	JFK-HND	380.	96	12:09	2:00	:15	.087	.156	.455	.143	97	.627	.844	1.248	94	.131	.086	F
2/28/78	HND-LAX	391.	35	7:35			.009	.023	.046	.021	63	.211	.385	.748	25	.038	.031	F
2/28/78	LAX-HND	386.	61	7:45	:20		.047	.085	.143	.076	78	.527	.782	.956	61	.069	.053	F
3/ 1/78	HND-JFK	380.	92	11:29	1:00		.080	.118	.219	.117	90	.583	.814	1.035	88	.142	.052	F
VL0015	FILE 1	382.3	868	563:37	29:36	:40	.047	.101	1.803	.228	2443	.419	.720	1.419	1580	.092	.062	F

GASP CABIN AND AMBIENT OZONE DATA SUMMARY

AIRCRAFT: N533PA (B747SP)

TAPE VL0015, FILE 2

DATE	ROUTE	FL	CABIN OZONE								AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)			
				HOURS:MIN			PPMV					PPMV						
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD	
3/ 2/78	JFK-HND	379.	87	12:05	2:50		.096	.144	.218	.128	92	.522	.711	.885	84	.178	.060	F
3/ 3/78	HND-LAX	383.	56	7:40			.018	.043	.103	.034	0	---	---	---	0	---	---	F
3/ 3/78	LAX-HND	372.	70	9:48	:05		.040	.072	.137	.074	71	.420	.679	.823	51	.088	.045	F
3/ 4/78	HND-JFK	360.	82	11:11	2:11		.071	.124	.183	.130	85	.488	.788	1.236	65	.144	.040	F
3/ 5/78	JFK-HND	370.	96	12:25	1:55		.089	.122	.191	.114	97	.621	.751	.939	94	.144	.056	F
3/ 6/78	HND-LAX	368.	67	8:25	:25		.045	.084	.157	.069	65	.298	.562	.780	39	.159	.097	F
3/ 6/78	LAX-HND	383.	74	9:55	:10		.058	.092	.147	.075	76	.526	.795	.925	57	.111	.048	F
3/ 7/78	HND-JFK	372.	94	11:10	:05		.058	.082	.124	.078	92	.536	.696	.830	90	.104	.035	F
3/ 8/78	JFK-HND	373.	93	12:16	:25		.059	.093	.155	.090	92	.527	.770	.901	79	.108	.042	F
3/ 9/78	HND-LAX	374.	53	7:45			.029	.061	.120	.044	0	---	---	---	0	---	---	F
3/ 9/78	LAX-HND	372.	66	8:28			.059	.097	.125	.092	66	.467	.725	.796	55	.107	.040	F
3/11/78	HND-JFK	369.	83	11:06			.067	.102	.121	.094	83	.508	.685	.830	80	.122	.050	F
3/11/78	JFK-HND	373.	86	11:45	:30		.061	.097	.235	.082	0	---	---	---	0	---	---	F
3/12/78	HND-LAX	382.	62	8:10	:05		.041	.076	.129	.077	62	.372	.581	.715	50	.105	.061	F
3/12/78	LAX-HND	377.	71	9:20	:35		.048	.083	.143	.074	82	.523	.809	.999	65	.078	.051	F
3/13/78	HND-JFK	362.	87	11:15	:40		.062	.098	.163	.083	86	.453	.624	.723	80	.134	.050	F
3/14/78	JFK-HND	372.	91	11:58	:50		.069	.104	.159	.088	96	.584	.806	.942	89	.109	.040	F
3/15/78	HND-LAX	381.	64	8:40	:05		.040	.075	.149	.056	61	.323	.570	.762	40	.116	.056	F
3/29/78	JFK-HND	369.	96	12:38	2:05	:10	.106	.154	.414	.139	94	.615	.739	.841	93	.173	.060	F
3/30/78	HND-LAX	366.	63	8:20	:15		.053	.087	.156	.072	64	.351	.544	.717	52	.153	.079	F
3/30/78	LAX-HND	373.	84	9:52	:50		.065	.104	.173	.095	83	.514	.777	.866	70	.113	.067	F
3/31/78	HND-JFK	362.	77	10:55	5:40		.126	.169	.237	.160	0	---	---	---	0	---	---	F
4/ 1/78	JFK-HND	376.	96	12:28	:30		.074	.107	.166	.099	96	.606	.876	1.236	93	.136	.078	F
4/ 2/78	HND-LAX	366.	59	8:00	:10		.045	.076	.191	.074	0	---	---	---	0	---	---	F
4/ 2/78	LAX-HND	372.	76	10:26	:40		.064	.101	.168	.101	64	.707	.906	1.237	62	.104	.035	F
4/ 3/78	HND-JFK	372.	86	11:25			.054	.073	.107	.070	0	---	---	---	0	---	---	F
4/ 4/78	JFK-HND	380.	95	12:25	1:40		.089	.120	.153	.117	0	---	---	---	0	---	---	F

GASP CABIN AND AMBIENT OZONE DATA SUMMARY

AIRCRAFT: N533PA (B747SP)

DATE	ROUTE	FL	CABIN OZONE							AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)			
				HOURS:MIN			PPMV				PPMV						
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD	
4/ 5/78	HND-LAX	375.	68	8:20			.031	.047	.074	.039	69	.273	.453	.630	43	.108	.034	F
4/ 5/78	LAX-HND	361.	27	3:20			.048	.073	.097	.051	117	.425	.684	.945	22	.110	.029	F
4/ 6/78	HND-JFK	364.	0	11:10			---	---	---	---	85	.468	.733	.857	0	---	---	F
4/ 7/78	JFK-HND	368.	0	12:46			---	---	---	---	99	.584	.817	.972	0	---	---	F
4/ 8/78	HND-LAX	380.	0	8:30			---	---	---	---	63	.408	.667	.833	0	---	---	F
4/ 8/78	LAX-HND	364.	0	2:50			---	---	---	---	23	.068	.089	.130	0	---	---	F
4/13/78	JFK-HND	374.	0	12:15			---	---	---	---	94	.486	.734	.886	0	---	---	F
4/14/78	HND-LAX	372.	0	9:05			---	---	---	---	68	.350	.582	.942	0	---	---	F
4/16/78	JFK-HND	379.	0	12:37			---	---	---	---	101	.421	.644	.789	0	---	---	F
4/17/78	HND-LAX	378.	0	8:30			---	---	---	---	66	.286	.529	.794	0	---	---	F
4/18/78	HND-JFK	371.	0	11:08			---	---	---	---	89	.446	.702	.824	0	---	---	F
4/22/78	JFK-HND	378.	0	12:26			---	---	---	---	97	.523	.804	1.022	0	---	---	F
4/23/78	HND-LAX	377.	0	8:00			---	---	---	---	63	.246	.453	.674	0	---	---	F
4/24/78	HND-JFK	364.	0	11:25			---	---	---	---	86	.316	.549	.771	0	---	---	F
4/25/78	JFK-HND	373.	96	12:35	:15		.065	.100	.194	.092	96	.528	.754	.901	85	.119	.041	F
4/26/78	HND-LAX	389.	63	8:09	:05		.042	.071	.150	.066	0	---	---	---	0	---	---	F
4/26/78	LAX-HND	383.	79	9:59	:05		.068	.100	.127	.098	0	---	---	---	0	---	---	F
4/27/78	HND-JFK	368.	90	11:35	1:05		.074	.114	.250	.120	0	---	---	---	0	---	---	F
4/28/78	JFK-HND	369.	97	12:30	:20		.059	.098	.139	.110	0	---	---	---	0	---	---	F
4/29/78	HND-LAX	386.	63	8:00	:04		.036	.069	.125	.055	0	---	---	---	0	---	---	F
4/29/78	LAX-HND	380.	80	10:12	1:42		.085	.136	.257	.123	0	---	---	---	0	---	---	F
4/30/78	HND-JFK	369.	89	11:35	1:10		.084	.127	.199	.115	0	---	---	---	0	---	---	F
5/ 1/78	JFK-HND	381.	96	12:30			.062	.093	.120	.097	0	---	---	---	0	---	---	F
5/ 2/78	HND-SFO	391.	61	7:56	:10		.048	.088	.126	.098	0	---	---	---	0	---	---	F
5/ 2/78	SFO-LAX	316.	2	:10			.000	.000	.000	---	0	---	---	---	0	---	---	F
5/ 2/78	LAX-HND	376.	80	10:42	:05		.053	.092	.134	.098	0	---	---	---	0	---	---	F
5/ 3/78	HND-JFK	367.	86	11:15	:20		.062	.107	.255	.105	0	---	---	---	0	---	---	F
VL0015	FILE 2	372.3	191	418:30	28:02	:10	.064	.106	.414	.160	2823	.470	.727	1.237	1538	.125	.060	F

GASP CABIN AND AMBIENT OZONE DATA SUMMARY

AIRCRAFT: N533PA (B747SP)

TAPE VL0015, FILE 3

DATE	ROUTE	FL	CABIN OZONE								AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)			
				HOURS:MIN			PPMV					PPMV						
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD	
5/ 4/78	JFK-HND	377.	92	12:20	:40		.072	.111	.146	.105	0	---	---	---	0	---	---	F
5/ 5/78	HND-SFO	371.	60	7:58			.041	.076	.119	.077	0	---	---	---	0	---	---	F
5/ 5/78	SFO-LAX	307.	2	:15			.004	.005	.005	---	0	---	---	---	0	---	---	F
5/ 5/78	LAX-HND	367.	71	9:05	:55		.071	.119	.162	.122	0	---	---	---	0	---	---	F
5/ 6/78	HND-JFK	378.	91	11:25			.057	.082	.110	.071	0	---	---	---	0	---	---	F
5/ 7/78	JFK-HND	370.	92	12:31	1:00	:05	.066	.129	.368	.094	0	---	---	---	0	---	---	F
5/ 8/78	HND-SFO	391.	53	6:50	:05		.029	.053	.137	.032	0	---	---	---	0	---	---	F
5/ 8/78	SFO-LAX	331.	3	:20			.004	.006	.005	---	0	---	---	---	0	---	---	F
5/ 8/78	LAX-HND	375.	78	9:57	2:15		.059	.116	.153	.134	0	---	---	---	0	---	---	F
5/ 9/78	HND-ORD	361.	84	11:15			.048	.079	.095	.073	0	---	---	---	0	---	---	F
5/10/78	ORD-JFK	313.	8	:50			.022	.030	.034	---	0	---	---	---	0	---	---	F
5/10/78	JFK-HND	381.	103	13:20	1:55		.072	.118	.231	.110	0	---	---	---	0	---	---	F
5/11/78	HND-SFO	391.	56	7:43			.037	.071	.105	.074	0	---	---	---	0	---	---	F
5/11/78	SFO-LAX	319.	2	:10			.000	.000	.000	---	0	---	---	---	0	---	---	F
5/11/78	LAX-HND	374.	78	10:21	:49	:04	.031	.076	.309	.074	80	.152	.329	.676	24	.161	.135	F
5/12/78	HND-JFK	374.	79	10:41	:05		.056	.090	.132	.088	81	.498	.729	.886	72	.103	.044	F
5/13/78	JFK-HND	371.	96	12:00	:40		.073	.122	.295	.104	96	.481	.689	.832	85	.157	.095	F
5/14/78	HND-SFO	397.	61	7:40			.042	.077	.121	.069	62	.388	.636	.927	51	.109	.058	F
5/14/78	SFO-LAX	334.	3	:17			.005	.008	.009	---	0	---	---	---	0	---	---	F
5/14/78	LAX-HND	371.	77	10:00	2:15		.084	.130	.203	.129	76	.479	.678	.786	69	.178	.057	F
5/15/78	HND-JFK	370.	88	11:26	2:25		.070	.124	.186	.127	0	---	---	---	0	---	---	F
5/16/78	JFK-HND	385.	89	12:05	3:05		.083	.139	.304	.140	0	---	---	---	0	---	---	F
5/17/78	HND-SFO	390.	62	8:15	:20		.044	.087	.143	.092	64	.286	.523	.742	37	.153	.061	F
5/17/78	SFO-LAX	336.	3	:15			.013	.014	.014	---	0	---	---	---	0	---	---	F
5/17/78	LAX-HND	376.	77	9:50	:55		.057	.103	.213	.107	78	.349	.615	.736	47	.160	.064	F
5/18/78	HND-JFK	368.	87	11:19	:05		.047	.084	.153	.098	0	---	---	---	0	---	---	F
5/19/78	JFK-HND	380.	87	11:46	:25		.074	.113	.144	.114	88	.465	.655	.727	83	.154	.051	F
5/20/78	HND-SFO	387.	63	8:05			.041	.071	.104	.061	64	.294	.508	.692	43	.140	.059	F

GASP CABIN AND AMBIENT OZONE DATA SUMMARY

AIRCRAFT: N533PA (B747SP)

DATE	ROUTE	FL	CABIN OZONE							AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)			
				HOURS:MIN		PPMV					PPMV						
			ND	TOTAL	>.1E >.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD	
5/20/78	SFO-LAX	331.	2	:13		.003	.006	.006	---	2	.115	.155	.155	1	.000	---	F
5/21/78	LAX-AKL	372.	83	11:09		.009	.021	.072	.018	93	.045	.066	.103	0	---	---	F
5/21/78	AKL-SYD	416.	16	1:50		.009	.020	.053	---	17	.174	.234	.302	16	.049	.048	F
5/22/78	SYD-AKL	397.	11	1:45		.015	.024	.035	---	12	.210	.251	.275	11	.064	.038	F
5/22/78	AKL-LAX	390.	85	10:55		.008	.018	.062	.012	83	.081	.197	.474	15	.051	.031	F
5/23/78	LAX-AKL	374.	103	11:52		.008	.017	.041	.013	104	.051	.094	.212	13	.105	.092	F
5/23/78	AKL-SYD	431.	1	:00		.016	---	.016	---	1	.353	---	.353	1	.045	---	F
5/24/78	SYD-AKL	398.	12	1:36		.020	.026	.031	---	12	.257	.293	.348	12	.076	.034	F
5/24/78	AKL-NAN	316.	7	1:33		.019	.034	.044	---	7	.053	.078	.087	0	---	---	F
5/24/78	NAN-LAX	386.	60	8:18		.015	.027	.055	.020	62	.079	.206	.573	7	.054	.012	F
5/24/78	LAX-SFO	287.	1	:00		.006	---	.006	---	1	.121	---	.121	1	.050	---	F
5/24/78	SFO-HKG	378.	96	13:18		.047	.080	.115	.088	95	.387	.610	.700	80	.119	.046	F
5/26/78	HKG-SFO	366.	65	9:37		.039	.069	.120	.063	71	.236	.443	.689	35	.162	.167	F
5/26/78	SFO-HKG	375.	98	13:05	1:05	.055	.088	.143	.092	102	.263	.477	.661	64	.202	.071	F
5/27/78	HKG-SIN	394.	20	2:32		.020	.029	.038	---	19	.050	.062	.079	0	---	---	F
5/28/78	SIN-HKG	392.	21	2:40		.014	.020	.027	---	21	.040	.053	.074	0	---	---	F
5/28/78	HKG-SFO	373.	85	11:06	:10	.020	.041	.146	.033	85	.158	.339	.708	29	.094	.042	F
5/29/78	SFO-HKG	369.	103	13:19		.026	.047	.081	.054	103	.200	.419	.758	41	.116	.063	F
5/29/78	HKG-SIN	404.	18	2:18		.014	.030	.051	---	18	.049	.066	.091	0	---	---	F
5/30/78	SIN-HKG	406.	17	2:10	:10	.016	.046	.136	---	17	.056	.070	.086	0	---	---	F
5/30/78	HKG-SFO	373.	86	11:05		.020	.042	.107	.046	86	.185	.385	.713	35	.095	.043	F
6/ 1/78	SFO-AKL	375.	85	11:35		.002	.007	.028	.007	84	.047	.073	.132	7	.007	.017	F
6/ 1/78	AKL-SYD	374.	18	2:15		.009	.020	.035	---	17	.079	.104	.149	2	.000	.000	F
6/ 2/78	SYD-LAX	368.	87	11:20		.009	.023	.077	.017	91	.040	.063	.170	3	.019	.017	F
6/ 3/78	LAX-AKL	376.	87	11:49		.003	.009	.037	.008	89	.053	.077	.115	7	.021	.036	F
6/ 3/78	AKL-SYD	376.	17	2:10		.003	.007	.017	---	17	.164	.225	.233	13	.022	.044	F
6/ 4/78	SYD-MEL	312.	3	:20		.007	.009	.011	---	3	.133	.185	.173	2	.036	.004	F
6/ 4/78	MEL-SYD	365.	3	:13		.007	.011	.011	---	0	---	---	---	0	---	---	F

GASP CABIN AND AMBIENT OZONE DATA SUMMARY

AIRCRAFT: N533PA (B747SP)

DATE	ROUTE	FL	CABIN OZONE								AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)			
				HOURS:MIN			PPMV					PPMV						
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD	
6/ 4/78	SYD-LAX	376.	85	12:03			.004	.009	.024	.006	92	.065	.102	.181	13	.020	.028	F
6/ 4/78	LAX-JFK	389.	29	3:40	:10		.027	.069	.209	.032	30	.393	.570	.652	24	.056	.064	F
6/ 5/78	JFK-BAH	382.	83	10:52			.016	.032	.056	.037	82	.299	.524	.687	56	.052	.026	F
6/ 7/78	BAH-JFK	381.	89	12:01			.015	.030	.053	.032	90	.238	.427	.706	61	.052	.045	F
6/ 8/78	JFK-LAX	385.	33	4:14			.009	.019	.034	.013	33	.235	.402	.612	21	.043	.028	F
6/ 9/78	LAX-AKL	376.	86	11:33			.003	.008	.040	.005	88	.058	.110	.311	8	.016	.020	F
6/ 9/78	AKL-SYD	379.	17	1:55			.008	.016	.021	---	18	.268	.408	.509	16	.026	.018	F
6/10/78	SYD-AKL	396.	21	1:45			.013	.021	.032	---	21	.280	.401	.457	19	.067	.054	F
6/10/78	AKL-LAX	370.	85	11:14			.006	.015	.033	.010	87	.058	.094	.206	8	.052	.035	F
6/10/78	LAX-NRT	374.	71	10:00	:05		.029	.056	.144	.054	71	.388	.620	.699	51	.069	.043	F
6/11/78	NRT-JFK	359.	84	10:55			.044	.072	.091	.070	85	.391	.625	.692	60	.112	.033	F
6/12/78	JFK-NRT	377.	88	12:00	:15		.051	.083	.153	.078	93	.461	.677	.709	74	.111	.057	F
6/13/78	NRT-SFO	381.	58	7:30	:05		.013	.032	.134	.018	60	.215	.394	.557	35	.048	.036	F
6/13/78	SFO-LAX	324.	2	:10			.006	.011	.011	---	2	.098	.104	.104	1	.106	---	F
6/13/78	LAX-NRT	381.	78	10:18	:15		.049	.091	.136	.105	79	.370	.616	.759	64	.123	.061	F
6/14/78	NRT-JFK	373.	82	11:03			.028	.051	.068	.052	85	.383	.638	.679	57	.076	.064	F
6/15/78	JFK-LAX	419.	31	4:25			.008	.016	.022	.010	32	.209	.306	.437	27	.045	.037	F
6/15/78	LAX-NRT	371.	70	8:45			.010	.026	.064	.019	69	.141	.282	.542	25	.065	.056	F
6/16/78	NRT-JFK	362.	79	10:36			.020	.035	.065	.036	69	.305	.540	.702	44	.064	.036	F
6/17/78	JFK-NRT	380.	95	12:29			.047	.077	.109	.081	93	.462	.692	.747	72	.098	.035	F
6/18/78	NRT-SFO	377.	61	8:10			.011	.022	.052	.014	47	.192	.360	.603	20	.039	.048	F
6/18/78	SFO-LAX	331.	2	:15			.003	.006	.006	---	2	.084	.122	.122	1	.049	---	F
6/18/78	LAX-LHR	381.	64	8:45			.048	.086	.117	.086	67	.373	.614	.720	45	.124	.054	F
6/19/78	LHR-AMS	230.	1	:00			.020	---	.020	---	1	.120	---	.120	1	.167	---	F
6/19/78	AMS-LHR	251.	1	:00			.003	---	.003	---	1	.140	---	.140	1	.021	---	F
6/19/78	LHR-LAX	384.	71	9:45	:10		.069	.105	.130	.097	72	.530	.723	.693	62	.128	.051	F
6/20/78	LAX-NRT	369.	82	9:39	:05		.014	.037	.129	.034	0	---	---	---	0	---	---	F
6/21/78	NRT-JFK	372.	85	11:05			.029	.054	.087	.056	87	.365	.596	.706	66	.069	.041	F
VL0015	FILE 3	376.4668		612:50	20:24	:09	.036	.076	.368	.140	3557	.254	.494	.927	1838	.106	.075	F

GASP CABIN AND AMBIENT OZONE DATA SUMMARY

AIRCRAFT: N533PA (B747SP)

TAPE VL0016, FILE 1

DATE	ROUTE	FL	CABIN OZONE							AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)			
			HOURS:MIN			PPMV				PPMV							
			ND	TOTAL	>.1E >.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD	
6/22/78	JFK-LAX	407.	36	4:32		.007	.018	.046	.010	0	---	---	---	0	---	---	F
6/22/78	LAX-NRT	375.	61	9:40		.009	.020	.053	.012	71	.099	.194	.360	16	.052	.031	F
6/23/78	NRT-JFK	375.	84	10:59		.047	.073	.098	.074	84	.412	.592	.639	73	.112	.042	F
6/24/78	JFK-NRT	380.	98	12:20		.045	.078	.111	.084	28	.159	.229	.275	20	.079	.059	F
6/25/78	NRT-SFO	379.	59	8:10		.016	.031	.066	.022	10	.340	.478	.507	9	.065	.034	F
6/25/78	SFO-LAX	322.	2	:10		.001	.002	.002	---	2	.209	.290	.290	2	.004	.004	F
6/25/78	LAX-LHR	388.	64	8:35		.046	.071	.107	.067	64	.425	.567	.636	61	.106	.044	F
6/26/78	LHR-AMS	246.	1	:00		.003	---	.003	---	1	.147	---	.147	1	.021	---	F
6/26/78	AMS-LHR	251.	1	:00		.026	---	.026	---	1	.062	---	.062	0	---	---	F
6/26/78	LHR-LAX	380.	80	9:50	1:00	.066	.107	.156	.113	80	.493	.666	.721	77	.128	.052	F
6/27/78	LAX-AKL	359.	89	11:30		.002	.006	.017	.004	91	.044	.064	.129	2	.013	.005	F
6/27/78	AKL-SYD	380.	18	2:05		.005	.009	.012	---	18	.241	.308	.476	18	.022	.015	F
6/28/78	SYD-AKL	387.	14	1:45		.007	.018	.034	---	14	.264	.343	.407	14	.029	.046	F
6/28/78	AKL-LAX	375.	66	9:54		.006	.019	.065	.016	77	.053	.121	.475	6	.032	.043	F
6/28/78	LAX-JFK	402.	29	3:45		.003	.008	.016	.003	29	.112	.190	.371	8	.032	.032	F
6/29/78	JFK-NRT	382.	101	12:43		.034	.056	.090	.061	101	.458	.580	.633	99	.074	.040	F
6/30/78	NRT-SFO	377.	60	8:05		.011	.025	.063	.020	60	.225	.399	.545	43	.047	.052	F
6/30/78	SFO-LAX	283.	2	:10		.010	.020	.020	---	0	---	---	---	0	---	---	F
6/30/78	LAX-LHR	379.	67	8:40		.025	.046	.090	.040	69	.351	.570	.690	54	.089	.108	F
7/ 1/78	AMS-LHR	239.	1	:00		.002	---	.002	---	1	.068	---	.068	0	---	---	F
7/ 1/78	LHR-LAX	381.	78	9:45		.034	.068	.120	.076	79	.341	.548	.746	71	.082	.054	F
7/ 2/78	LAX-AKL	374.	94	11:45		.002	.005	.012	.004	94	.070	.138	.298	18	.022	.014	F
7/ 2/78	AKL-SYD	395.	21	2:26		.002	.006	.023	---	25	.136	.251	.474	11	.016	.014	F
7/ 3/78	SYD-AKL	393.	13	1:35		.001	.003	.007	---	13	.161	.250	.438	10	.004	.011	F
7/ 3/78	AKL-LAX	376.	81	10:45		.002	.008	.039	.006	86	.050	.072	.138	5	.009	.014	F
7/ 3/78	LAX-LHR	385.	68	8:35		.030	.049	.113	.042	70	.424	.595	.684	66	.074	.055	F
7/ 4/78	AMS-LHR	261.	1	:00		.004	---	.004	---	1	.181	---	.181	1	.023	---	F
7/ 4/78	LHR-LAX	384.	80	9:53		.034	.052	.083	.052	81	.487	.654	.698	79	.065	.027	F
7/ 5/78	LAX-NRT	364.	73	9:35		.010	.024	.066	.024	76	.170	.338	.643	32	.062	.042	F
7/ 6/78	NRT-JFK	378.	83	11:00		.018	.035	.059	.035	88	.281	.489	.619	59	.065	.040	F
7/ 7/78	JFK-NRT	376.	95	11:50		.016	.033	.112	.029	96	.331	.540	.640	73	.049	.036	F
7/ 8/78	NRT-SFO	387.	65	8:00		.011	.023	.049	.017	65	.212	.387	.606	40	.056	.051	F
7/ 8/78	SFO-LAX	275.	2	:10		.010	.021	.021	---	2	.087	.091	.091	0	---	---	F

DATE	ROUTE	FL	CABIN OZONE								AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)			
				HOURS:MIN			PPMV					PPMV						
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD	
7/ 8/78	LAX-LHR	375.	67	8:30			.018	.038	.100	.026	68	.320	.511	.636	55	.061	.062	F
7/ 9/78	LHR-AMS	238.	1	:00			.000	---	.000	---	1	.165	---	.165	1	.000	---	F
7/ 9/78	AMS-LHR	248.	1	:00			.006	---	.006	---	1	.107	---	.107	1	.058	---	F
7/ 9/78	LHR-LAX	382.	77	9:35			.018	.038	.103	.039	78	.362	.544	.596	72	.045	.041	F
7/10/78	LAX-LHR	389.	69	9:00			.023	.044	.083	.039	73	.370	.570	.644	61	.062	.049	F
7/11/78	LHR-LAX	379.	78	9:50			.031	.056	.072	.058	78	.389	.599	.661	66	.073	.040	F
7/12/78	LAX-JFK	405.	26	3:45			.012	.030	.086	.014	31	.113	.161	.215	14	.130	.147	F
7/13/78	JFK-NRT	374.	94	12:10			.024	.044	.092	.044	96	.333	.560	.624	67	.068	.039	F
7/14/78	NRT-SFO	381.	63	8:10			.009	.019	.035	.015	67	.217	.403	.570	37	.036	.049	F
7/14/78	SFO-LAX	274.	2	:10			.000	.000	.000	---	2	.067	.093	.093	0	---	---	F
7/14/78	LAX-LHR	381.	65	8:45	:10		.023	.045	.131	.033	72	.349	.532	.569	58	.061	.091	F
7/15/78	LHR-AMS	230.	1	:00			.000	---	.000	---	1	.068	---	.068	0	---	---	F
7/15/78	LHR-LAX	375.	77	9:45			.012	.025	.054	.026	78	.244	.438	.616	53	.049	.063	F
7/16/78	LAX-AKL	373.	90	11:45			.003	.009	.050	.004	88	.054	.091	.248	6	.014	.016	F
7/16/78	AKL-SYD	423.	17	2:00			.003	.007	.012	.003	17	.359	.456	.603	17	.010	.011	F
7/17/78	SYD-AKL	371.	16	1:40			.005	.010	.013	.005	16	.238	.319	.338	15	.016	.018	F
7/17/78	AKL-LAX	382.	79	11:10			.000	.002	.013	.001	90	.039	.058	.113	1	.000	---	F
7/17/78	LAX-NRT	397.	75	9:45			.006	.014	.033	.013	78	.205	.335	.546	57	.023	.022	F
7/18/78	NRT-JFK	368.	83	11:10			.014	.032	.080	.019	90	.269	.461	.592	62	.032	.033	F
7/19/78	JFK-NRT	377.	101	12:33			.015	.031	.062	.037	101	.294	.463	.591	89	.042	.036	F
7/20/78	NRT-SFO	388.	60	7:49			.009	.019	.060	.013	64	.213	.355	.577	45	.035	.033	F
7/20/78	SFO-LAX	285.	2	:10			.000	.000	.000	---	2	.078	.080	.080	0	---	---	F
7/20/78	LAX-LHR	392.	67	8:20			.022	.041	.081	.038	68	.335	.519	.623	58	.073	.074	F
7/21/78	LHR-AMS	241.	1	:00			.000	---	.000	---	1	.076	---	.076	0	---	---	F
7/21/78	LHR-LAX	375.	78	9:50			.017	.034	.088	.025	81	.330	.482	.615	72	.052	.055	F
7/22/78	LAX-AKL	365.	94	11:47			.002	.005	.016	.004	94	.074	.140	.337	14	.023	.018	F
7/22/78	AKL-SYD	420.	22	2:45			.001	.003	.006	---	23	.187	.270	.433	21	.010	.016	F
7/23/78	SYD-MEL	363.	3	:20			.000	.000	.000	---	3	.312	.401	.411	3	.000	.000	F
7/23/78	MEL-SYD	343.	2	:10			.001	.001	.001	---	2	.223	.296	.296	2	.002	.002	F
7/23/78	SYD-LAX	381.	87	11:50			.002	.008	.030	.006	97	.050	.071	.122	3	.191	.038	F
7/23/78	LAX-NRT	392.	64	9:30			.006	.014	.042	.009	75	.172	.300	.511	37	.032	.030	F
7/24/78	NRT-JFK	371.	88	11:00			.008	.016	.045	.014	89	.253	.449	.581	61	.039	.033	F
7/25/78	JFK-NRT	382.	98	12:10			.023	.044	.064	.051	99	.320	.500	.601	88	.060	.042	F
7/26/78	NRT-SFO	391.	62	7:50	:10		.014	.047	.209	.028	63	.180	.332	.558	40	.097	.295	F
7/26/78	SFO-LAX	284.	1	:00			.000	---	.000	---	1	.048	---	.048	0	---	---	F

GASP CABIN AND AMBIENT OZONE DATA SUMMARY

AIRCRAFT: N533PA (B747SP)

DATE	ROUTE	FL	CABIN OZONE								AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)			
				HOURS:MIN			PPMV					PPMV						
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD	
7/26/78	LAX-LHR	361.	73	9:00			.022	.039	.056	.040	73	.312	.499	.558	59	.065	.032	F
7/27/78	LHR-LAX	386.	72	9:12			.019	.038	.096	.034	75	.340	.510	.570	69	.058	.082	F
7/28/78	LAX-AKL	373.	88	11:26			.001	.003	.009	.001	92	.040	.089	.312	9	.008	.012	F
7/28/78	AKL-SYD	417.	17	2:00			.013	.023	.040	---	18	.506	.689	.875	16	.028	.029	F
7/29/78	SYD-AKL	353.	15	1:48			.011	.023	.047	---	16	.379	.638	.723	13	.031	.024	F
7/29/78	AKL-LAX	378.	84	11:03			.003	.009	.038	.004	86	.067	.122	.503	8	.017	.012	F
7/29/78	LAX-NRT	385.	74	9:00			.009	.018	.029	.014	73	.236	.431	.598	45	.040	.032	F
7/30/78	NRT-JFK	335.	32	11:02			.026	.046	.071	.016	35	.235	.424	.516	13	.057	.055	F
7/31/78	JFK-NRT	375.	97	12:20			.010	.018	.042	.016	99	.261	.421	.566	70	.034	.033	F
8/ 1/78	NRT-SFO	386.	62	8:00			.007	.018	.050	.013	66	.178	.342	.591	35	.046	.084	F
8/ 1/78	SFO-LAX	344.	1	:00			.000	---	.000	---	1	.107	---	.107	1	.000	---	F
8/ 1/78	LAX-LHR	384.	65	8:52			.017	.032	.068	.025	71	.353	.527	.620	58	.044	.040	F
8/ 2/78	LHR-LAX	386.	73	9:10			.017	.030	.064	.026	74	.349	.528	.573	63	.050	.044	F
8/ 3/78	LAX-AKL	377.	89	11:10			.002	.006	.023	.004	90	.071	.125	.332	10	.000	.000	F
8/ 4/78	AKL-SYD	380.	16	2:02			.006	.012	.018	---	17	.220	.313	.390	15	.042	.051	F
8/ 4/78	SYD-LAX	374.	92	12:30			.007	.017	.054	.014	95	.049	.085	.186	9	.096	.062	F
8/ 4/78	LAX-NRT	369.	76	9:30			.004	.011	.034	.007	75	.047	.076	.126	5	.040	.048	F
8/ 5/78	NRT-JFK	372.	86	11:10			.008	.015	.024	.013	90	.241	.379	.489	70	.036	.031	F
8/ 6/78	JFK-NRT	378.	89	12:20	:20		.021	.055	.198	.034	98	.218	.358	.519	76	.083	.135	F
8/ 7/78	NRT-SFO	379.	61	8:00			.003	.009	.045	.006	64	.130	.208	.478	32	.008	.016	F
8/ 7/78	SFO-LAX	291.	0	:10			---	---	---	---	2	.088	.101	.101	0	---	---	F
8/ 7/78	LAX-LHR	384.	72	9:00			.008	.016	.027	.014	73	.261	.449	.519	51	.039	.044	F
8/ 8/78	LHR-LAX	373.	75	9:20			.006	.014	.027	.014	74	.239	.381	.524	57	.026	.024	F
8/ 9/78	LAX-NRT	372.	76	9:35			.003	.009	.027	.005	77	.065	.094	.156	11	.043	.054	F
8/10/78	NRT-JFK	373.	85	11:09			.006	.015	.054	.011	82	.190	.308	.471	57	.025	.044	F
8/11/78	JFK-NRT	368.	90	11:20	:05		.013	.031	.192	.021	99	.235	.367	.497	71	.053	.087	F
8/12/78	NRT-SFO	384.	57	7:45	:10		.010	.033	.140	.018	63	.187	.320	.518	36	.063	.212	F
8/12/78	SFO-LAX	350.	2	:10			.000	.000	.000	---	2	.085	.095	.095	0	---	---	F
8/12/78	LAX-LHR	388.	69	8:40			.010	.020	.033	.019	70	.238	.409	.565	47	.036	.030	F
8/13/78	LHR-AMS	249.	1	:00			.001	---	.001	---	1	.091	---	.091	0	---	---	F
8/13/78	LHR-LAX	382.	78	9:50			.012	.021	.042	.018	78	.370	.504	.560	74	.030	.021	F
8/14/78	LAX-SFO	291.	2	:11			.001	.001	.001	---	2	.030	.060	.060	0	---	---	F
VL0016	FILE 1	377.5367		697:36	1:55		.015	.036	.209	.113	5396	.233	.429	.875	3224	.055	.071	F

GASP CABIN AND AMBIENT OZONE DATA SUMMARY

AIRCRAFT: N533PA (B747SP)

TAPE VL0016, FILE 2

DATE	ROUTE	FL	CABIN OZONE								AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)			
				HOURS:MIN			PPMV					PPMV						
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD	
8/14/78	SFO-HKG	372.	95	12:20			.002	.005	.014	.003	95	.083	.172	.446	11	.012	.013	F
8/15/78	HKG-BKK	385.	19	2:36			.003	.008	.017	---	21	.014	.024	.063	0	---	---	F
8/16/78	BKK-HKG	399.	24	2:51			.005	.012	.023	---	24	.022	.038	.081	0	---	---	F
8/16/78	HKG-SFO	368.	88	11:00			.007	.016	.048	.012	88	.108	.185	.404	40	.038	.052	F
8/17/78	SFO-HKG	370.	97	12:10			.003	.009	.048	.006	98	.052	.071	.121	4	.055	.034	F
8/17/78	HKG-SIN	419.	18	2:20			.004	.011	.024	---	19	.033	.047	.065	0	---	---	F
8/18/78	SIN-HKG	397.	19	2:35			.010	.018	.027	---	21	.020	.026	.035	0	---	---	F
8/18/78	HKG-SFO	366.	84	11:00			.007	.021	.096	.015	87	.072	.121	.209	21	.036	.035	F
8/19/78	SFO-HKG	373.	95	12:15			.006	.013	.032	.009	95	.065	.091	.172	10	.053	.060	F
8/19/78	HKG-SIN	419.	19	2:29			.002	.005	.012	---	18	.030	.045	.057	0	---	---	F
8/20/78	SIN-HKG	393.	20	2:41			.006	.014	.037	---	20	.025	.031	.047	0	---	---	F
8/20/78	HKG-SFO	376.	87	11:48	:05		.011	.028	.142	.020	89	.134	.272	.472	27	.038	.060	F
8/21/78	SFO-HKG	363.	90	12:25			.003	.007	.019	.005	91	.095	.208	.460	13	.021	.025	F
8/21/78	HKG-SIN	385.	20	2:36			.004	.013	.038	---	21	.030	.046	.061	0	---	---	F
8/22/78	SIN-HKG	400.	20	2:40			.005	.011	.016	---	21	.025	.032	.041	0	---	---	F
8/22/78	HKG-LAX	369.	87	11:55			.015	.036	.115	.024	93	.112	.220	.461	28	.117	.159	F
8/22/78	LAX-NRT	372.	75	9:56			.005	.015	.059	.010	79	.108	.182	.333	30	.030	.052	F
8/23/78	NRT-JFK	376.	82	10:55			.009	.017	.036	.014	83	.214	.336	.455	63	.045	.041	F
8/24/78	JFK-LAX	391.	33	4:10			.007	.016	.036	.008	33	.108	.143	.200	20	.050	.074	F
8/24/78	LAX-AKL	372.	82	11:28			.003	.008	.048	.005	81	.050	.140	.586	8	.024	.034	F
8/24/78	AKL-SYD	379.	8	1:10			.025	.049	.081	---	8	.444	.563	.561	7	.047	.043	F
8/25/78	SYD-LAX	375.	87	12:07			.008	.024	.103	.014	91	.048	.085	.284	8	.065	.082	F
8/25/78	LAX-NRT	375.	73	9:50			.007	.019	.082	.013	74	.160	.255	.427	42	.039	.051	F
8/26/78	NRT-JFK	374.	72	9:53			.007	.018	.055	.010	72	.168	.277	.489	44	.038	.089	F
8/27/78	JFK-BAH	375.	84	10:55			.003	.008	.026	.006	84	.147	.233	.400	59	.021	.023	F
8/28/78	BAH-BOM	392.	11	1:30			.005	.009	.013	---	11	.081	.099	.132	1	.099	---	F
8/28/78	BOM-BAH	372.	18	2:09			.004	.008	.013	---	18	.063	.077	.086	0	---	---	F
8/28/78	BAH-JFK	375.	90	12:05			.008	.021	.067	.012	93	.151	.243	.466	62	.055	.079	F
8/29/78	JFK-NRT	375.	98	12:40			.011	.025	.074	.025	98	.233	.374	.500	80	.041	.034	F
8/30/78	NRT-SFO	389.	58	7:35			.001	.005	.013	.002	59	.132	.185	.284	40	.006	.014	F
8/30/78	LAX-NRT	370.	78	10:08			.002	.008	.025	.005	79	.073	.097	.128	7	.037	.070	F
8/31/78	NRT-JFK	373.	84	10:59			.006	.018	.116	.010	85	.183	.278	.427	61	.034	.066	F
9/ 1/78	JFK-NRT	374.	98	12:23			.008	.017	.035	.012	98	.238	.385	.552	73	.035	.041	F

GASP CABIN AND AMBIENT OZONE DATA SUMMARY

AIRCRAFT: N533PA (B747SP)

DATE	ROUTE	FL	CABIN OZONE							AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)			
			HOURS:MIN			PPMV				PPMV							
			ND	TOTAL	>.1E >.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD	
9/ 2/78	NRT-SFO	373.	56	7:35		.004	.011	.048	.006	58	.134	.249	.424	31	.023	.028	F
9/ 2/78	SFO-LAX	289.	3	:20		.000	.000	.000	---	3	.030	.041	.041	0	---	---	F
9/ 2/78	LAX-LHR	374.	64	8:50	:05	.018	.043	.174	.034	69	.250	.380	.532	53	.077	.092	F
9/ 3/78	LHR-AMS	242.	1	:00		.000	---	.000	---	1	.084	---	.084	0	---	---	F
9/ 3/78	AMS-LHR	241.	1	:00		.006	---	.006	---	1	.082	---	.082	0	---	---	F
9/ 3/78	LHR-LAX	377.	71	9:45		.018	.034	.069	.033	75	.253	.387	.506	58	.063	.054	F
9/ 4/78	LAX-SFO	263.	2	:07		.012	.018	.018	---	2	.064	.065	.065	0	---	---	F
9/ 4/78	SFO-LAX	332.	3	:20		.013	.024	.027	---	3	.065	.087	.087	0	---	---	F
9/ 4/78	LAX-LHR	368.	77	8:34		.007	.018	.057	.009	79	.218	.360	.484	54	.015	.020	F
9/ 5/78	AMS-LHR	250.	1	:00		.005	---	.005	---	1	.061	---	.061	0	---	---	F
9/ 5/78	LHR-LAX	380.	132	9:39	:10	.017	.052	.217	.033	134	.196	.344	.474	91	.080	.126	F
9/ 6/78	LAX-NRT	378.	75	9:43		.009	.018	.034	.016	76	.291	.413	.445	63	.033	.028	F
9/ 7/78	NRT-JFK	366.	82	10:28		.004	.011	.038	.007	82	.189	.302	.396	58	.024	.045	F
9/ 8/78	JFK-NRT	379.	89	12:21		.014	.031	.085	.022	91	.243	.413	.539	57	.052	.055	F
9/ 9/78	NRT-SFO	378.	57	7:27		.004	.010	.032	.006	63	.164	.250	.401	40	.019	.033	F
9/ 9/78	SFO-LAX	310.	2	:10		.008	.010	.010	---	2	.053	.060	.060	0	---	---	F
9/ 9/78	LAX-LHR	372.	65	8:37	:10	.015	.038	.131	.026	70	.194	.329	.474	44	.090	.164	F
9/10/78	LHR-AMS	248.	1	:00		.001	---	.001	---	1	.046	---	.046	0	---	---	F
9/10/78	AMS-LHR	252.	1	:00		.002	---	.002	---	1	.056	---	.056	0	---	---	F
9/10/78	LHR-LAX	379.	72	9:45		.016	.035	.092	.023	73	.297	.423	.490	65	.048	.052	F
9/11/78	LAX-SFO	323.	2	:10		.000	.000	.000	---	2	.057	.071	.071	0	---	---	F
9/11/78	SFO-HKG	376.	110	13:04		.009	.020	.057	.019	102	.192	.336	.474	62	.033	.042	F
9/12/78	HKG-BKK	377.	23	2:45		.003	.007	.013	---	23	.027	.039	.055	0	---	---	F
9/13/78	BKK-HKG	393.	22	3:00		.001	.003	.008	.001	22	.033	.047	.055	0	---	---	F
9/13/78	HKG-SFO	360.	39	10:40		.005	.012	.050	.009	43	.117	.186	.319	22	.019	.027	F
9/13/78	SFO-HKG	373.	98	12:50		.003	.008	.019	.007	98	.054	.074	.093	0	---	---	F
9/14/78	HKG-SIN	410.	18	2:30		.007	.020	.054	---	20	.026	.042	.064	0	---	---	F
9/15/78	SIN-HKG	399.	18	2:39		.016	.031	.052	---	19	.023	.034	.047	0	---	---	F
9/15/78	HKG-SFO	376.	86	11:05		.008	.016	.033	.010	86	.135	.236	.427	37	.036	.034	F
9/15/78	SFO-HKG	374.	96	12:54	:10	.012	.037	.142	.026	98	.051	.072	.108	2	.348	.336	F
9/16/78	HKG-SIN	412.	20	2:29		.010	.019	.025	---	20	.027	.043	.065	0	---	---	F
9/17/78	SIN-HKG	398.	22	2:40		.006	.010	.014	---	21	.033	.049	.076	0	---	---	F
9/17/78	HKG-SFO	372.	82	11:03		.005	.011	.023	.007	84	.109	.211	.415	28	.025	.037	F
9/17/78	SFO-HKG	374.	94	13:00		.005	.016	.087	.011	99	.061	.087	.163	7	.151	.198	F
9/18/78	HKG-SIN	381.	29	2:34		.009	.016	.037	---	27	.016	.020	.026	0	---	---	F
9/19/78	SIN-HKG	396.	22	2:40		.015	.035	.114	---	23	.025	.035	.045	0	---	---	F

DATE	ROUTE	FL	CABIN OZONE								AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)			
				HOURS:MIN			PPMV					PPMV						
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD	
9/19/78	HKG-LAX	376.	89	11:38			.008	.022	.089	.018	91	.119	.208	.326	36	.038	.085	F
9/19/78	LAX-NRT	383.	73	9:55			.004	.009	.032	.007	74	.087	.149	.351	13	.015	.016	F
9/20/78	NRT-JFK	360.	82	11:06			.009	.021	.068	.017	86	.148	.254	.464	51	.062	.100	F
9/21/78	JFK-LAX	384.	29	4:25			.003	.008	.017	.005	34	.099	.129	.171	9	.017	.032	F
9/21/78	LAX-NRT	376.	74	10:05			.010	.028	.087	.016	80	.076	.130	.291	14	.046	.046	F
9/22/78	NRT-JFK	361.	85	11:25			.009	.023	.074	.018	88	.158	.274	.379	49	.036	.086	F
9/23/78	JFK-EZE	353.	50	6:30			.004	.008	.014	.006	50	.067	.082	.100	1	.078	---	F
9/24/78	EZE-JFK	368.	71	8:58			.003	.009	.031	.005	72	.060	.075	.097	0	---	---	F
9/24/78	JFK-NRT	373.	97	12:32	:05		.011	.025	.128	.014	98	.201	.306	.385	76	.051	.071	F
9/25/78	NRT-SFO	390.	58	7:47			.007	.017	.060	.009	58	.200	.327	.456	43	.040	.059	F
9/25/78	SFO-LAX	294.	3	:13			.015	.025	.025	---	3	.034	.043	.038	0	---	---	F
9/25/78	LAX-NRT	380.	79	10:00			.006	.012	.026	.007	81	.170	.270	.412	53	.028	.032	F
9/26/78	NRT-JFK	382.	87	11:00			.008	.019	.086	.012	87	.197	.310	.436	65	.037	.045	F
9/27/78	JFK-BAH	394.	76	10:48			.011	.024	.061	.015	83	.155	.256	.386	49	.047	.084	F
9/27/78	BAH-BOM	398.	18	2:10			.012	.020	.029	---	18	.074	.085	.095	0	---	---	F
9/27/78	BOM-BAH	416.	16	2:10			.003	.008	.015	---	18	.070	.094	.109	2	.000	.000	F
9/27/78	BAH-JFK	366.	104	12:33			.005	.011	.032	.010	107	.098	.141	.236	45	.048	.039	F
9/28/78	JFK-NRT	390.	99	12:37			.008	.017	.032	.015	99	.244	.364	.502	83	.035	.030	F
9/29/78	NRT-SFO	393.	59	7:50			.004	.012	.037	.007	61	.131	.198	.286	42	.033	.057	F
9/29/78	SFO-LAX	329.	2	:10			.011	.018	.018	---	2	.032	.038	.038	0	---	---	F
9/29/78	LAX-LHR	387.	50	8:51			.011	.025	.110	.014	50	.148	.248	.407	38	.074	.073	F
9/30/78	LHR-AMS	239.	1	:00			.007	---	.007	---	1	.045	---	.045	0	---	---	F
9/30/78	AMS-LHR	237.	1	:00			.004	---	.004	---	1	.045	---	.045	0	---	---	F
9/30/78	LHR-LAX	376.	80	10:13			.011	.021	.054	.020	81	.157	.274	.423	40	.058	.030	F
10/ 1/78	LAX-AKL	372.	90	11:39			.006	.015	.049	.011	89	.018	.054	.188	5	.045	.038	F
10/ 1/78	AKL-SYD	398.	14	1:52			.012	.018	.025	---	14	.311	.478	.569	11	.052	.054	F
10/ 2/78	SYD-AKL	393.	17	2:00			.041	.068	.090	---	17	.190	.316	.531	14	.265	.206	F
10/ 2/78	AKL-LAX	378.	88	10:58			.004	.013	.038	.009	86	.037	.115	.451	3	.036	.018	F
10/ 2/78	LAX-NRT	381.	87	10:20			.013	.022	.041	.021	87	.130	.247	.502	41	.075	.043	F
10/ 3/78	NRT-JFK	377.	86	11:10			.013	.021	.036	.019	87	.177	.280	.355	60	.073	.027	F
10/ 4/78	JFK-NRT	371.	98	13:00			.014	.023	.040	.022	97	.168	.237	.340	79	.085	.032	F
10/ 5/78	NRT-SFO	385.	61	7:50			.006	.012	.023	.009	61	.110	.217	.381	17	.043	.033	F
VL0016	FILE 2	375.5	573	726:38	:45		.008	.021	.217	.034	5680	.134	.253	.586	2470	.047	.072	F

APPENDIX B - SUMMARY TABULATIONS OF GASP OZONE DATA

FOR N4711U (BOEING 747-100); 1/6/78-10/6/78

GASP CABIN AND AMBIENT OZONE DATA SUMMARY

AIRCRAFT: N4711U (B747-100)

TAPE VL0017, FILE 1

DATE	ROUTE	FL	CABIN OZONE								AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)		
				HOURS:MIN			PPMV					PPMV					
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD
1/ 6/78	SFO-HNL	353.	17	4:02			.015	.034	.055	.022	35	.080	.135	.197	8	.171	.082
1/ 7/78	HNL-LAS	317.	25	3:52			.024	.049	.066	.030	27	.056	.083	.149	3	.481	.095
1/ 7/78	LAS-ORD	321.	17	2:00			.055	.075	.090	---	0	---	---	---	0	---	---
1/ 7/78	ORD-YYZ	299.	2	:10			.009	.016	.016	---	2	.114	.128	.128	2	.087	.071
1/ 7/78	YYZ-ORD	282.	3	:20			.005	.009	.009	---	4	.078	.088	.091	0	---	---
1/ 7/78	ORD-HNL	334.	42	5:37			.028	.046	.073	.034	0	---	---	---	0	---	---
1/ 9/78	SFO-LAX	306.	2	:10			.091	.109	.109	---	2	.349	.423	.423	2	.262	.004
1/ 9/78	LAX-JFK	361.	30	3:45	:55		.079	.132	.207	.080	0	---	---	---	0	---	---
1/10/78	JFK-LAX	381.	33	4:21	1:06		.082	.156	.235	.119	0	---	---	---	0	---	---
1/10/78	LAX-ORD	355.	19	2:35			.039	.072	.094	---	17	.185	.266	.334	13	.212	.098
1/10/78	ORD-SFO	372.	29	3:11	1:10		.110	.157	.198	.115	0	---	---	---	0	---	---
1/11/78	SFO-HNL	344.	21	3:55	:45		.044	.104	.176	.062	34	.175	.362	.523	13	.275	.120
1/11/78	HNL-SFO	369.	28	3:40	1:05		.069	.138	.219	.081	23	.199	.384	.564	13	.335	.114
1/13/78	HNL-SFO	370.	30	3:44			.026	.055	.111	.027	30	.083	.193	.465	3	.280	.072
1/14/78	SFO-ORD	328.	28	3:36	:15		.059	.100	.144	---	15	.152	.239	.385	12	.512	.178
1/15/78	ORD-JFK	345.	6	:40	:20		.107	.147	.160	---	0	---	---	---	0	---	---
1/15/78	JFK-SFO	368.	26	3:38	1:25		.103	.150	.173	.114	0	---	---	---	0	---	---
1/15/78	SFO-HNL	354.	39	5:00			.028	.045	.079	.031	40	.051	.068	.133	1	.323	---
1/16/78	HNL-ORD	351.	45	5:55	:35		.053	.106	.222	.086	45	.183	.348	.669	27	.267	.097
1/16/78	ORD-YYZ	282.	2	:10			.009	.018	.018	---	2	.047	.047	.047	0	---	---
1/16/78	YYZ-ORD	327.	4	:30			.070	.116	.111	---	4	.279	.419	.426	3	.185	.132
1/16/78	ORD-HNL	338.	62	8:37	:30		.030	.070	.131	.077	64	.110	.217	.386	20	.323	.066
1/17/78	HNL-LAX	360.	26	3:32			.010	.017	.027	.010	26	.038	.048	.057	0	---	---
1/17/78	LAX-HNL	349.	41	4:58			.019	.032	.053	.020	40	.043	.056	.075	0	---	---
1/18/78	HNL-LAX	387.	27	3:32			.009	.016	.031	.010	28	.051	.066	.074	0	---	---
1/18/78	LAX-JFK	361.	28	3:25			.037	.064	.119	.040	29	.125	.216	.353	11	.277	.143
1/19/78	JFK-LAX	387.	39	4:51	:45	:05	.075	.150	.328	.112	41	.215	.372	.710	27	.358	.117
1/19/78	LAX-JFK	361.	29	3:40	:10		.049	.084	.130	.060	30	.177	.301	.448	21	.286	.089
1/19/78	JFK-LAX	372.	32	4:20	1:00		.074	.134	.236	.100	34	.251	.409	.563	26	.308	.120
1/21/78	LAX-ORD	361.	21	2:31	:46		.120	.179	.239	---	0	---	---	---	0	---	---
1/21/78	ORD-HNL	346.	57	7:15	:05		.051	.081	.129	.067	0	---	---	---	0	---	---
1/22/78	HNL-ORD	343.	43	6:45	:15		.036	.072	.130	.070	52	.142	.246	.355	28	.268	.134
1/22/78	ORD-HNL	344.	61	7:40	:55		.054	.095	.173	.084	0	---	---	---	0	---	---
1/23/78	HNL-LAX	372.	33	4:05			.030	.052	.092	.031	33	.096	.143	.218	13	.289	.159
1/23/78	LAX-HNL	354.	32	4:10			.019	.038	.067	.021	33	.064	.098	.171	5	.267	.142
1/24/78	HNL-SFO	361.	28	3:46			.027	.056	.099	.033	28	.099	.173	.296	10	.317	.110
1/24/78	SFO-ORD	320.	26	3:00	:05		.048	.083	.125	---	25	.153	.269	.365	15	.278	.126
1/24/78	ORD-JFK	343.	5	:40			.001	.003	.004	---	6	.065	.110	.175	1	.000	---
1/25/78	JFK-SFO	378.	36	4:25	3:15	:55	.215	.362	.617	.278	35	.471	.811	1.388	31	.471	.143

DATE	ROUTE	FL	CABIN OZONE								AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)		
			HOURS:MIN				PPMV				PPMV						
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD
1/25/78	SFO-HNL	344.	30	4:12			.037	.049	.063	.038	29	.073	.104	.155	4	.375	.051
1/26/78	HNL-SFO	373.	27	3:40			.069	.094	.110	.077	28	.199	.300	.355	21	.353	.065
1/26/78	SFO-HNL	353.	31	3:50	:25		.055	.096	.179	.060	31	.124	.206	.344	10	.402	.130
1/27/78	HNL-LAX	386.	39	3:55	:20		.068	.105	.166	.078	37	.220	.381	.550	16	.275	.062
1/27/78	LAX-JFK	373.	28	3:38	1:58	:48	.176	.327	.496	.210	28	.433	.799	1.292	19	.480	.494
1/28/78	JFK-ORD	320.	7	:55	:45		.165	.225	.275	---	7	.254	.361	.401	6	.656	.093
1/28/78	ORD-LAX	376.	24	3:00	:45		.079	.138	.200	.079	23	.284	.475	.805	23	.290	.113
1/28/78	LAX-ITO	353.	31	4:13	:10		.054	.090	.175	.068	33	.127	.188	.220	22	.416	.185
1/29/78	ITO-LAX	356.	28	3:40	:40		.073	.115	.169	.082	0	---	---	---	0	---	---
1/29/78	LAX-ORD	355.	21	2:25	:20		.078	.115	.180	---	21	.237	.356	.568	20	.377	.161
1/29/78	ORD-JFK	339.	8	:53	:47	:37	.380	.552	.572	---	8	.774	1.175	1.338	5	.435	.126
1/29/78	JFK-LAX	366.	33	4:30	1:36		.112	.158	.213	.117	33	.304	.432	.568	31	.360	.161
1/30/78	LAX-HNL	356.	38	4:40			.040	.063	.097	.044	38	.099	.140	.190	15	.384	.123
1/30/78	HNL-SFO	358.	29	3:35	:05		.060	.091	.132	.065	29	.200	.288	.377	25	.285	.092
1/31/78	SFO-HNL	355.	31	4:10			.049	.070	.099	.055	0	---	---	---	0	---	---
1/31/78	HNL-LAX	362.	29	3:46	1:35		.089	.146	.176	.109	29	.216	.316	.388	26	.386	.131
1/31/78	LAX-JFK	361.	27	3:30	:30		.076	.116	.187	.076	27	.196	.312	.618	24	.402	.135
1/31/78	JFK-LAX	389.	35	4:45	3:05	:10	.163	.226	.315	.158	35	.317	.421	.524	35	.526	.141
2/ 1/78	LAX-ITO	354.	36	4:35			.048	.067	.098	.050	36	.116	.165	.268	13	.353	.175
2/ 2/78	ITO-LAX	379.	27	3:30	:10		.047	.085	.233	.051	27	.138	.201	.376	22	.325	.098
2/ 2/78	LAX-ORD	359.	19	2:25			.076	.101	.107	---	19	.199	.240	.258	18	.395	.126
2/ 2/78	ORD-SFO	381.	26	3:19	2:10		.151	.196	.229	.158	26	.270	.361	.462	25	.571	.109
2/ 3/78	SFO-HNL	355.	34	4:15	:05		.044	.075	.128	.055	28	.109	.214	.356	10	.325	.079
2/ 3/78	HNL-SFO	353.	27	3:35	:35		.071	.112	.160	.080	26	.146	.277	.504	12	.419	.195
2/ 3/78	SFO-HNL	354.	33	4:03	:10		.055	.094	.177	.064	33	.089	.206	.472	5	.362	.166
2/ 4/78	HNL-LAX	374.	45	3:46	:14		.042	.083	.155	.048	45	.127	.278	.659	10	.302	.247
2/ 4/78	LAX-JFK	371.	23	2:45	1:20		.142	.231	.308	---	0	---	---	---	0	---	---
2/ 4/78	JFK-ORD	367.	10	1:05	1:00		.146	.176	.190	---	0	---	---	---	0	---	---
2/ 4/78	ORD-LAX	338.	25	2:55			.037	.054	.080	---	25	.064	.102	.150	5	.421	.104
2/ 5/78	LAX-JFK	363.	29	3:40	1:20		.110	.201	.265	.127	29	.239	.485	.674	11	.429	.134
2/ 6/78	JFK-LAX	351.	36	4:27	1:45		.092	.145	.206	.103	35	.202	.365	.518	21	.430	.138
2/ 6/78	LAX-HNL	343.	36	4:41			.023	.043	.084	.029	30	.047	.065	.074	0	---	---
2/ 7/78	HNL-LAX	368.	27	3:35			.012	.018	.024	.013	27	.030	.048	.054	0	---	---
2/ 7/78	LAX-HNL	372.	40	5:00			.030	.044	.051	.031	32	.043	.061	.103	1	.252	---
2/ 8/78	HNL-LAX	367.	25	3:23			.012	.022	.042	.013	18	.064	.085	.097	0	---	---
2/ 8/78	LAX-JFK	358.	30	3:45	1:15		.095	.138	.163	.109	30	.332	.522	.698	24	.285	.093
2/ 9/78	JFK-LAX	351.	36	4:34	:40	:10	.084	.163	.358	.094	34	.207	.414	.833	18	.407	.197
2/ 9/78	LAX-ORD	356.	17	2:20	:30		.093	.168	.260	---	17	.230	.392	.588	11	.385	.114
2/ 9/78	ORD-SFO	371.	26	3:15	1:25	:05	.124	.182	.318	.128	25	.280	.458	.743	22	.456	.155
2/13/78	HNL-LAX	369.	18	2:35	:25		.075	.121	.192	---	19	.256	.383	.568	16	.298	.075

GASP CABIN AND AMBIENT OZONE DATA SUMMARY

AIRCRAFT: N4711U (B747-100)

DATE	ROUTE	FL	CABIN OZONE								AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)		
				HOURS:MIN			PPMV					PPMV					
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD
2/13/78	LAX-JFK	375.	29	3:40	1:55		.135	.204	.252	.153	29	.341	.531	.712	28	.401	.096
2/13/78	JFK-ORD	309.	20	2:09	:10		.065	.113	.198	---	19	.084	.124	.193	2	.662	.232
2/14/78	ORD-HNL	345.	58	7:50	:35		.056	.083	.122	.067	0	---	---	---	0	---	---
2/15/78	HNL-LAX	349.	29	3:54			.037	.061	.100	.042	28	.125	.178	.271	15	.274	.137
2/15/78	LAX-HNL	355.	35	4:35			.043	.059	.080	.043	35	.106	.144	.198	24	.377	.099
2/16/78	HNL-SFO	361.	30	3:45			.041	.059	.097	.044	29	.115	.141	.168	20	.341	.121
2/16/78	SFO-ORD	372.	22	2:40	2:30	:40	.223	.334	.455	---	22	.527	.793	.971	20	.447	.116
2/16/78	ORD-JFK	343.	6	:40	:40		.150	.177	.172	---	6	.372	.427	.443	6	.431	.143
2/17/78	JFK-SFO	366.	34	4:35	3:50	:40	.211	.296	.386	.255	1	.192	---	.192	1	.313	---
2/17/78	SFO-HNL	355.	30	4:05			.048	.060	.073	.050	0	---	---	---	0	---	---
2/18/78	HNL-ORD	345.	53	6:52	1:55		.082	.149	.242	.138	0	---	---	---	0	---	---
2/18/78	ORD-YYZ	289.	3	:20	:10		.085	.127	.127	---	0	---	---	---	0	---	---
2/18/78	YYZ-ORD	318.	2	:20			.053	.079	.079	---	0	---	---	---	0	---	---
2/18/78	ORD-HNL	343.	73	7:29			.048	.069	.108	.050	0	---	---	---	0	---	---
2/19/78	HNL-LAX	384.	68	3:59	1:16		.099	.137	.173	.115	0	---	---	---	0	---	---
2/19/78	LAX-HNL	343.	38	4:32			.038	.056	.094	.040	0	---	---	---	0	---	---
2/20/78	HNL-SFO	362.	27	3:40	:15		.064	.098	.168	.067	0	---	---	---	0	---	---
2/20/78	SFO-ORD	356.	24	3:00	1:30	:10	.141	.253	.308	.141	0	---	---	---	0	---	---
2/20/78	ORD-JFK	364.	8	:40	:40		.270	.318	.310	---	0	---	---	---	0	---	---
2/21/78	SFO-HNL	344.	33	4:15			.053	.078	.119	.054	26	.059	.076	.147	1	.449	---
2/22/78	HNL-ORD	348.	54	6:47	1:42	:42	.097	.206	.378	.187	54	.178	.346	.583	27	.515	.206
2/22/78	ORD-DEN	365.	11	1:20	1:10	:05	.223	.296	.320	---	10	.538	.625	.638	10	.418	.105
2/22/78	DEN-LAX	331.	10	1:10			.052	.070	.095	---	9	.086	.116	.141	4	.477	.052
2/22/78	LAX-HNL	340.	39	4:38			.048	.065	.102	.055	0	---	---	---	0	---	---
2/23/78	HNL-LAX	335.	30	3:47			.041	.061	.091	.044	30	.117	.206	.348	7	.279	.096
2/25/78	LAX-JFK	361.	28	3:35	1:00		.089	.176	.276	.100	26	.211	.429	.655	9	.392	.064
2/25/78	JFK-ORD	349.	9	1:00	:50	:05	.233	.298	.317	---	9	.643	.846	.783	8	.349	.038
2/25/78	ORD-LAX	356.	27	3:20	:20		.080	.129	.226	.083	0	---	---	---	0	---	---
2/26/78	LAX-JFK	356.	26	3:30	1:05		.078	.149	.222	.089	24	.211	.439	.684	11	.340	.097
2/27/78	JFK-LAX	353.	37	4:53	2:28	:30	.153	.265	.397	.225	0	---	---	---	0	---	---
2/27/78	LAX-ORD	354.	19	2:20	:05		.079	.100	.129	---	19	.241	.330	.323	16	.305	.099
2/27/78	ORD-SFO	378.	27	3:24	2:09		.148	.195	.218	.159	0	---	---	---	0	---	---
2/28/78	SFO-HNL	369.	33	4:15	:30		.062	.121	.247	.077	0	---	---	---	0	---	---
2/28/78	HNL-SFO	357.	26	3:26	1:01		.072	.149	.254	.083	26	.220	.426	.677	16	.287	.092
2/28/78	SFO-HNL	346.	32	4:10	:30		.052	.107	.214	.064	34	.140	.270	.589	14	.387	.232
3/ 1/78	HNL-LAX	329.	34	3:37	:48		.082	.155	.246	.094	0	---	---	---	0	---	---
3/ 1/78	LAX-SFO	297.	0	:10			---	---	---	---	2	.163	.309	.309	0	---	---
3/ 1/78	SFO-ORD	358.	20	2:35	:50		.097	.183	.247	---	20	.228	.415	.531	10	.404	.101
3/ 1/78	ORD-JFK	328.	6	:40	:40	:20	.261	.378	.394	---	0	---	---	---	0	---	---
3/ 2/78	JFK-SFO	362.	42	5:04	2:05		.106	.166	.239	.148	0	---	---	---	0	---	---

DATE	ROUTE	FL	CABIN OZONE								AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)		
			HOURS:MIN			PPMV					PPMV						
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD
3/ 2/78	SFO-HNL	345.	35	4:55			.052	.067	.091	.053	0	---	---	---	0	---	---
3/ 3/78	HNL-ORD	343.	38	4:51	1:51		.100	.162	.233	.130	0	---	---	---	0	---	---
3/ 6/78	ORD-SFO	378.	24	2:55	2:25	:25	.233	.324	.367	---	24	.504	.709	.713	23	.495	.106
3/ 7/78	SFO-HNL	355.	37	4:36			.038	.052	.066	.041	37	.048	.074	.101	1	.515	---
3/ 7/78	HNL-LAX	331.	30	3:50			.033	.058	.118	.034	32	.077	.108	.138	7	.256	.069
3/ 8/78	LAX-DEN	344.	11	1:16	:10		.053	.089	.142	---	9	.046	.061	.082	0	---	---
3/ 8/78	DEN-ORD	369.	12	1:13	1:07	:32	.280	.378	.381	---	11	.653	.826	.800	11	.490	.195
3/ 8/78	ORD-DEN	360.	10	1:15	:55	:20	.231	.344	.361	---	10	.440	.669	.683	8	.517	.146
3/ 8/78	DEN-LAX	357.	10	1:15			.036	.056	.078	---	10	.033	.050	.060	0	---	---
3/ 8/78	LAX-HNL	343.	36	4:26	:19		.052	.085	.153	.059	36	.099	.162	.277	8	.499	.176
3/ 9/78	HNL-SFO	362.	29	3:40			.032	.046	.080	.035	29	.070	.094	.175	3	.317	.030
3/10/78	SFO-HNL	355.	32	4:01			.037	.050	.072	.036	0	---	---	---	0	---	---
3/10/78	HNL-SFO	369.	28	3:48	:15		.062	.097	.144	.070	29	.140	.216	.347	14	.444	.054
3/10/78	SFO-HNL	354.	36	3:53			.049	.076	.099	.049	36	.115	.177	.275	14	.393	.192
3/11/78	HNL-LAX	348.	33	4:10	:50		.072	.127	.230	.083	0	---	---	---	0	---	---
3/11/78	LAX-HNL	353.	32	4:08	:45		.076	.147	.295	.089	0	---	---	---	0	---	---
3/12/78	HNL-SFO	362.	29	3:57			.055	.078	.095	.060	0	---	---	---	0	---	---
3/12/78	SFO-JFK	350.	32	4:10	3:40	:25	.233	.319	.413	.271	31	.528	.717	.818	25	.426	.077
3/13/78	JFK-ORD	368.	10	1:15	1:05	:16	.236	.311	.319	---	10	.473	.603	.637	10	.508	.149
3/13/78	DEN-LAX	366.	10	1:11	:10		.087	.132	.171	---	10	.219	.345	.433	8	.416	.117
3/13/78	LAX-HNL	344.	31	4:15			.043	.063	.081	.047	31	.084	.115	.193	5	.438	.125
3/14/78	HNL-ORD	325.	52	6:26	1:36		.068	.126	.227	.114	52	.193	.382	.645	20	.306	.076
3/14/78	ORD-YYZ	304.	3	:20	:10		.152	.208	.208	---	3	.413	.657	.602	2	.279	.066
3/14/78	YYZ-ORD	310.	3	:20	:20		.173	.191	.189	---	3	.533	.623	.619	3	.339	.052
3/14/78	ORD-HNL	339.	58	7:40	1:15		.084	.141	.240	.130	0	---	---	---	0	---	---
3/15/78	HNL-ORD	349.	53	6:40	2:15	:20	.117	.221	.357	.205	0	---	---	---	0	---	---
3/15/78	ORD-LAX	385.	25	3:00	2:40		.227	.301	.306	.227	25	.570	.798	.783	22	.426	.130
3/15/78	LAX-ITO	351.	36	4:20			.035	.049	.068	.040	36	.077	.105	.172	8	.453	.113
3/16/78	ITO-LAX	357.	30	3:43	:05		.058	.080	.136	.062	0	---	---	---	0	---	---
3/16/78	LAX-ORD	356.	22	2:38	1:38		.135	.208	.255	---	0	---	---	---	0	---	---
3/16/78	ORD-JFK	326.	9	:49	:45	:10	.247	.324	.319	---	0	---	---	---	0	---	---
3/16/78	JFK-LAX	366.	36	4:38	2:58		.141	.214	.260	.190	34	.423	.667	.803	28	.343	.073
3/17/78	LAX-HNL	344.	31	3:46			.048	.067	.108	.054	31	.135	.185	.207	22	.334	.102
3/18/78	ORD-HNL	343.	59	7:30	1:15	:10	.083	.156	.330	.143	61	.158	.316	.696	29	.468	.124
3/19/78	HNL-ORD	345.	88	6:28	:35		.075	.107	.160	.095	0	---	---	---	0	---	---
3/19/78	ORD-YYZ	275.	2	:10			.054	.055	.055	---	0	---	---	---	0	---	---
3/19/78	YYZ-ORD	312.	4	:31	:11		.116	.143	.153	---	0	---	---	---	0	---	---
3/19/78	ORD-HNL	351.	61	7:37	1:40		.084	.147	.293	.137	0	---	---	---	0	---	---
3/20/78	HNL-LAX	366.	27	3:40	1:00	:15	.100	.201	.317	.117	29	.262	.476	.750	21	.326	.124
VL0017	FILE 1	354.4	471	558:18	106:01	8:55	.076	.151	.617	.278	2858	.181	.368	1.388	1395	.377	.163

GASP CABIN AND AMBIENT OZONE DATA SUMMARY

AIRCRAFT: N4711U (B747-100)

TAPE VL0017, FILE 2

DATE	ROUTE	FL	CABIN OZONE								AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)		
				HOURS:MIN			PPMV					PPMV					
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD
3/22/78	SFO-HNL	346.	18	1:57	:17		.079	.118	.168	---	18	.191	.336	.624	11	.370	.174
3/24/78	LAX-JFK	383.	45	3:52	1:28		.129	.202	.295	.152	44	.260	.444	.657	37	.490	.096
3/24/78	JFK-LAX	380.	36	4:30	2:40		.122	.187	.239	.156	0	---	---	---	0	---	---
3/26/78	ORD-YYZ	283.	2	:10			.068	.100	.100	---	2	.029	.050	.050	0	---	---
3/26/78	YYZ-ORD	282.	3	:20			.030	.042	.050	---	0	---	---	---	0	---	---
3/26/78	ORD-HNL	343.	48	6:35			.052	.070	.098	.061	0	---	---	---	0	---	---
3/27/78	HNL-ORD	302.	33	6:42	2:32		.062	.094	.124	.087	0	---	---	---	0	---	---
3/27/78	ORD-HNL	340.	60	7:38	:30		.061	.094	.189	.083	0	---	---	---	0	---	---
3/28/78	HNL-LAX	273.	1	:00			.062	---	.062	---	1	.082	---	.082	0	---	---
3/29/78	LAX-DEN	369.	12	1:05			.085	.106	.124	---	0	---	---	---	0	---	---
3/29/78	DEN-ORD	355.	9	1:09	:20		.104	.126	.133	---	0	---	---	---	0	---	---
3/29/78	ORD-HNL	346.	60	7:30	1:05	:05	.066	.132	.333	.112	60	.157	.360	.830	16	.392	.168
3/30/78	HNL-LAX	369.	32	3:50	1:40	:25	.122	.237	.328	.141	32	.298	.589	.824	14	.366	.069
3/30/78	LAX-HNL	352.	30	4:15	1:00		.086	.175	.264	.110	30	.241	.511	.786	9	.330	.071
3/31/78	HNL-SFO	289.	4	3:47			.053	.075	.076	.025	4	.049	.084	.084	0	---	---
3/31/78	SFO-ORD	322.	22	2:47			.027	.039	.051	---	22	.077	.126	.260	1	.146	---
4/ 1/78	ORD-JFK	311.	6	:45			.037	.049	.058	---	6	.066	.075	.075	0	---	---
4/ 1/78	SFO-HNL	316.	30	4:00			.036	.051	.081	.037	30	.066	.105	.146	6	.389	.112
4/ 2/78	HNL-ORD	346.	55	6:50	1:55		.087	.158	.267	.154	55	.198	.378	.647	23	.425	.105
4/ 2/78	ORD-DEN	363.	12	1:30	:25		.108	.157	.195	---	12	.276	.386	.434	10	.374	.074
4/ 2/78	DEN-LAX	354.	3	:20	:10		.128	.148	.148	---	3	.276	.408	.386	2	.360	.083
4/ 2/78	LAX-HNL	354.	36	4:30			.050	.070	.104	.052	37	.081	.116	.170	10	.489	.191
4/ 3/78	HNL-SFO	360.	33	3:55	:35		.074	.139	.266	.079	33	.180	.371	.721	15	.395	.097
4/ 5/78	SFO-HNL	352.	31	4:00			.051	.069	.094	.050	32	.146	.208	.347	26	.398	.162
4/ 6/78	HNL-ORD	354.	55	6:38	:25		.047	.077	.175	.061	54	.122	.197	.413	20	.338	.107
4/ 6/78	ORD-DEN	368.	3	:20			.118	.126	.124	---	3	.285	.446	.475	2	.323	.062
4/ 6/78	DEN-LAX	366.	12	1:30			.068	.103	.126	---	12	.156	.244	.302	7	.434	.281
4/ 6/78	LAX-HNL	346.	40	4:24	:20		.068	.103	.161	.066	39	.155	.247	.446	28	.420	.132
4/ 7/78	HNL-ORD	349.	58	6:51	:55		.054	.104	.210	.087	59	.153	.330	.683	22	.325	.121
4/ 7/78	ORD-DEN	367.	13	1:36			.058	.074	.083	---	13	.164	.217	.237	12	.363	.101
4/10/78	SFO-ORD	348.	23	2:45	1:20		.101	.171	.226	---	23	.344	.640	.795	13	.293	.128
4/10/78	ORD-JFK	339.	6	:40			.041	.056	.057	---	6	.048	.063	.069	0	---	---
4/11/78	SFO-HNL	355.	32	4:15			.060	.081	.114	.060	32	.100	.140	.206	16	.513	.129
4/12/78	HNL-ORD	321.	51	6:39			.038	.056	.097	.041	51	.074	.110	.174	8	.353	.067
4/13/78	JFK-LAX	362.	38	4:47	:05		.067	.108	.247	.078	37	.162	.224	.355	32	.406	.132
4/14/78	LAX-HNL	353.	38	4:45	:20		.076	.118	.204	.093	0	---	---	---	0	---	---
4/14/78	HNL-SFO	358.	30	3:40	1:33		.124	.199	.286	.139	30	.283	.472	.608	20	.420	.105
4/15/78	SFO-JFK	361.	30	3:45	1:00		.109	.143	.170	.117	30	.372	.481	.489	30	.322	.133
4/15/78	JFK-ORD	349.	10	1:10			.065	.083	.099	---	10	.222	.293	.339	8	.290	.101

GASP CABIN AND AMBIENT OZONE DATA SUMMARY

AIRCRAFT: N4711U (B747-100)

DATE	ROUTE	FL	CABIN OZONE								AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)		
				HOURS:MIN			PPMV					PPMV					
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD
4/15/78	ORD-LAX	331.	28	3:23			.058	.083	.116	.062	28	.100	.152	.313	9	.348	.103
4/16/78	LAX-DEN	344.	8	1:00			.049	.075	.096	---	9	.105	.131	.148	4	.580	.078
4/16/78	DEN-ORD	340.	8	1:00	:20		.093	.126	.132	---	8	.309	.429	.419	7	.344	.173
4/16/78	ORD-DEN	369.	11	1:20			.074	.104	.116	---	11	.228	.315	.413	11	.344	.132
4/16/78	DEN-LAX	361.	11	1:12	:30		.115	.162	.191	---	11	.418	.613	.739	10	.284	.118
4/16/78	LAX-HNL	353.	38	4:35			.042	.058	.088	.042	37	.073	.121	.240	6	.309	.046
4/17/78	HNL-ORD	352.	51	6:18	1:40		.095	.170	.269	.160	0	---	---	---	0	---	---
4/17/78	ORD-LAX	380.	15	1:50	1:45		.209	.251	.261	---	0	---	---	---	0	---	---
4/17/78	LAX-ITO	355.	35	4:20	:10		.056	.078	.126	.060	0	---	---	---	0	---	---
4/18/78	ITO-LAX	367.	29	3:27	:30		.078	.117	.175	.085	0	---	---	---	0	---	---
4/18/78	LAX-ORD	354.	17	2:15	1:25		.153	.236	.264	---	0	---	---	---	0	---	---
4/18/78	ORD-JFK	340.	8	:51			.046	.059	.063	---	0	---	---	---	0	---	---
4/18/78	JFK-LAX	356.	34	4:20	2:21		.117	.182	.245	.149	34	.369	.602	.742	25	.340	.125
4/19/78	LAX-HNL	354.	35	4:40	:10		.064	.091	.125	.074	35	.120	.177	.254	18	.444	.187
4/19/78	HNL-SFO	370.	26	3:30	:20		.058	.096	.155	.062	26	.151	.240	.364	16	.378	.078
4/21/78	SFO-HNL	353.	32	4:06			.054	.077	.110	.052	33	.067	.091	.111	3	.483	.090
4/22/78	HNL-SFO	359.	24	3:30			.051	.069	.095	.054	24	.097	.175	.266	7	.393	.222
4/23/78	SFO-JFK	363.	32	3:50	2:25	:15	.167	.266	.325	.201	31	.372	.617	.756	22	.451	.099
4/24/78	JFK-LAX	370.	34	4:27	2:15		.134	.213	.296	.178	33	.433	.757	.864	22	.330	.139
4/24/78	LAX-ORD	352.	20	2:35	:40		.080	.156	.240	---	20	.237	.495	.712	9	.343	.169
4/24/78	ORD-SFO	336.	27	3:15	:45		.079	.147	.227	.080	27	.166	.379	.642	8	.447	.223
4/25/78	SFO-HNL	355.	23	3:00			.046	.062	.083	.046	23	.076	.098	.128	3	.575	.175
4/25/78	HNL-SFO	359.	28	3:36			.040	.057	.106	.041	29	.104	.166	.404	12	.347	.095
4/26/78	SFO-ORD	351.	20	2:40	:30		.078	.135	.215	---	20	.163	.339	.550	7	.448	.152
4/26/78	ORD-JFK	337.	6	:48			.072	.095	.135	---	0	---	---	---	0	---	---
4/27/78	JFK-SFO	362.	39	4:33	1:05		.095	.170	.268	.118	39	.210	.377	.551	22	.435	.108
4/27/78	SFO-HNL	351.	29	3:40			.020	.045	.090	.023	31	.105	.173	.319	13	.231	.173
4/28/78	HNL-LAX	359.	31	4:30			.020	.041	.081	.027	34	.092	.135	.196	9	.203	.082
4/29/78	LAX-DEN	327.	11	1:05	:10		.077	.124	.175	---	0	---	---	---	0	---	---
4/29/78	DEN-ORD	380.	11	1:07	:52		.152	.207	.216	---	0	---	---	---	0	---	---
4/29/78	ORD-DEN	361.	10	1:10	:25		.123	.174	.225	---	11	.425	.563	.568	9	.253	.080
4/29/78	DEN-LAX	356.	10	1:10	:25		.104	.149	.145	---	10	.395	.555	.613	9	.296	.138
4/29/78	LAX-HNL	354.	34	4:10			.020	.040	.083	.022	0	---	---	---	0	---	---
4/30/78	HNL-LAX	333.	25	4:05			.020	.044	.113	.025	34	.052	.063	.081	0	---	---
4/30/78	LAX-HNL	353.	36	4:14			.034	.056	.089	.037	0	---	---	---	0	---	---
4/30/78	HNL-SFO	359.	33	3:55			.038	.066	.100	.045	0	---	---	---	0	---	---
5/ 7/78	SFO-ORD	358.	22	2:40	1:25	:05	.127	.216	.403	---	22	.419	.686	.712	16	.323	.150
5/ 7/78	ORD-JFK	344.	5	:30			.045	.071	.095	---	5	.079	.085	.085	0	---	---
5/ 8/78	JFK-SFO	381.	33	3:55	2:35		.170	.270	.309	.212	33	.463	.716	.799	29	.363	.100
VL0017	FILE 2	352.1989		252:14	43:18	:50	.073	.136	.403	.212	1478	.184	.376	.864	704	.380	.146

DATE	ROUTE	FL	CABIN OZONE								AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)		
				HOURS:MIN			PPMV					PPMV					
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD
5/ 8/78	SFO-HNL	355.	22	2:50			.025	.036	.059	---	29	.081	.168	.465	0	---	---
5/ 9/78	HNL-ORD	345.	48	6:55	:20		.038	.089	.273	.055	53	.142	.299	.673	21	.308	.135
5/ 9/78	ORD-DEN	374.	11	1:20	1:10		.195	.230	.258	---	0	---	---	---	0	---	---
5/ 9/78	DEN-LAX	360.	10	1:10	:10		.065	.107	.141	---	10	.224	.279	.298	9	.290	.152
5/ 9/78	LAX-HNL	353.	32	4:10			.038	.067	.111	.043	0	---	---	---	0	---	---
5/10/78	HNL-ORD	351.	50	6:40			.039	.055	.076	.043	44	.100	.150	.292	12	.272	.081
5/10/78	ORD-YYZ	319.	2	:10			.021	.035	.035	---	2	.177	.206	.206	2	.112	.058
5/10/78	YYZ-ORD	302.	5	:22			.055	.066	.075	---	0	---	---	---	0	---	---
5/10/78	ORD-HNL	358.	52	7:30	:05		.023	.047	.146	.029	0	---	---	---	0	---	---
5/11/78	HNL-LAX	351.	32	3:55			.017	.030	.059	.016	32	.096	.104	.110	10	.176	.104
5/11/78	LAX-HNL	350.	35	4:15			.040	.060	.077	.042	35	.092	.107	.122	14	.457	.190
5/12/78	HNL-LAX	336.	29	3:40			.020	.037	.062	.021	31	.088	.099	.116	4	.030	.052
5/13/78	JFK-ORD	365.	8	:50	:15		.057	.124	.225	---	8	.341	.627	.847	7	.159	.067
5/13/78	ORD-LAX	367.	21	2:53	:20		.057	.113	.215	---	21	.156	.297	.606	11	.341	.123
5/14/78	LAX-HNL	344.	29	4:20			.026	.052	.100	.027	0	---	---	---	0	---	---
5/15/78	HNL-SFO	358.	29	3:35	:05		.048	.081	.173	.050	0	---	---	---	0	---	---
5/15/78	SFO-ORD	353.	22	2:45	:05		.037	.057	.120	---	22	.103	.170	.283	5	.238	.027
5/15/78	ORD-JFK	329.	9	:58	:50		.189	.242	.233	---	0	---	---	---	0	---	---
5/16/78	JFK-SFO	369.	34	4:11	:55		.087	.161	.308	.092	32	.248	.420	.696	26	.346	.127
5/16/78	SFO-HNL	354.	33	4:10			.044	.066	.087	.050	32	.115	.167	.230	14	.377	.111
5/17/78	HNL-ORD	349.	52	6:43	:10		.038	.071	.132	.048	0	---	---	---	0	---	---
5/17/78	ORD-LAX	379.	24	2:53			.073	.101	.126	---	0	---	---	---	0	---	---
5/17/78	LAX-ITO	359.	24	3:15			.019	.038	.074	.021	24	.085	.138	.239	6	.237	.102
5/18/78	ITO-LAX	366.	30	3:43	:05		.041	.073	.163	.047	30	.114	.173	.288	14	.349	.156
5/18/78	LAX-ORD	360.	19	2:28	:10		.063	.100	.154	---	19	.170	.250	.407	16	.360	.100
5/18/78	ORD-JFK	346.	8	:50	:50		.199	.264	.273	---	8	.541	.666	.697	8	.440	.258
5/18/78	JFK-LAX	366.	35	4:20	:20		.048	.079	.131	.049	35	.204	.316	.564	30	.237	.093
5/18/78	LAX-HNL	354.	35	4:30			.028	.049	.087	.030	35	.081	.128	.242	6	.310	.117
5/19/78	HNL-SFO	359.	28	3:30			.038	.062	.086	.038	28	.092	.148	.307	5	.443	.144
5/20/78	SFO-JFK	389.	30	3:45	:50		.088	.127	.161	.090	29	.198	.282	.389	27	.489	.293
5/21/78	JFK-ORD	371.	7	:55			.047	.066	.078	---	7	.181	.223	.234	6	.246	.075
5/21/78	ORD-HNL	344.	60	7:42	:10		.054	.080	.125	.062	59	.090	.149	.381	17	.392	.176
5/22/78	LAX-HNL	346.	34	4:35	:10		.032	.065	.143	.038	34	.096	.182	.344	7	.337	.305
5/23/78	HNL-SFO	363.	28	3:30			.037	.060	.094	.040	28	.104	.168	.294	7	.345	.096
5/24/78	SFO-ORD	350.	0	2:31			---	---	---	---	20	.252	.473	.654	0	---	---

GASP CABIN AND AMBIENT OZONE DATA SUMMARY

AIRCRAFT: N4711U (B747-100)

DATE	ROUTE	FL	CABIN OZONE								AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)		
				HOURS:MIN			PPMV					PPMV					
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD
5/25/78	JFK-SFO	359.	0	4:27			---	---	---	---	41	.248	.451	.641	0	---	---
5/25/78	SFO-HNL	347.	18	2:25			.047	.080	.119	---	18	.048	.063	.091	0	---	---
5/26/78	HNL-SFO	334.	30	3:45			.024	.039	.074	.026	30	.047	.062	.082	0	---	---
5/27/78	SFO-JFK	366.	35	4:02	:42		.071	.117	.189	.085	36	.189	.330	.592	23	.390	.092
5/28/78	JFK-ORD	327.	8	:50			.048	.057	.060	---	8	.113	.129	.134	5	.367	.085
5/28/78	ORD-HNL	347.	54	7:05	:15		.042	.069	.135	.060	54	.102	.175	.377	13	.402	.137
5/29/78	HNL-ORD	343.	52	6:45	:15		.060	.094	.165	.077	52	.113	.206	.392	13	.402	.121
5/29/78	ORD-YYZ	306.	0	:10			---	---	---	---	2	.100	.109	.109	0	---	---
5/29/78	YYZ-ORD	302.	2	:10			.054	.070	.070	---	2	.106	.111	.111	2	.506	.124
5/29/78	ORD-HNL	343.	58	7:20			.033	.053	.107	.048	58	.072	.123	.277	6	.384	.103
5/30/78	HNL-SFO	361.	28	3:26			.027	.042	.067	.028	29	.069	.099	.140	4	.333	.172
5/30/78	SFO-HNL	354.	31	3:50			.048	.065	.091	.050	31	.057	.081	.100	1	.390	---
5/31/78	HNL-LAX	334.	29	3:44			.026	.041	.066	.029	29	.066	.095	.096	0	---	---
5/31/78	LAX-JFK	345.	32	4:00	:20		.065	.094	.133	.068	32	.126	.172	.287	21	.544	.288
6/ 1/78	JFK-LAX	384.	33	4:22	:10		.052	.083	.166	.053	34	.135	.210	.310	16	.382	.145
6/ 1/78	LAX-ORD	369.	16	2:29			.060	.086	.115	---	17	.099	.160	.277	4	.424	.130
6/ 1/78	ORD-SFO	366.	24	3:13	:15		.079	.115	.148	.084	27	.197	.290	.308	15	.405	.073
6/ 2/78	SFO-HNL	355.	33	4:05			.028	.041	.051	.033	33	.060	.088	.106	4	.363	.078
6/ 2/78	HNL-SFO	363.	25	3:30	:05		.036	.063	.152	.040	26	.079	.111	.144	6	.393	.141
6/ 2/78	SFO-HNL	354.	30	4:05			.042	.063	.087	.049	31	.086	.117	.169	8	.447	.092
6/ 2/78	HNL-LAX	335.	30	3:40			.045	.065	.081	.047	30	.078	.101	.115	9	.412	.185
6/ 3/78	LAX-JFK	361.	25	3:25	:05		.056	.085	.126	.062	25	.134	.221	.359	15	.402	.165
6/ 3/78	JFK-ORD	364.	9	1:00	:20		.111	.177	.234	---	9	.264	.454	.575	7	.430	.097
6/ 3/78	ORD-LAX	360.	24	2:56	:15		.056	.094	.165	---	24	.130	.221	.491	14	.447	.166
6/ 4/78	LAX-HNL	355.	33	4:10			.031	.045	.067	.034	33	.053	.075	.127	2	.425	.079
6/ 5/78	HNL-SFO	362.	28	3:35			.026	.039	.054	.027	28	.058	.070	.092	0	---	---
6/ 5/78	SFO-ORD	351.	24	2:50	1:30		.113	.169	.207	---	24	.301	.469	.545	17	.387	.071
6/ 5/78	ORD-JFK	343.	6	:40			.017	.023	.023	---	6	.058	.068	.079	0	---	---
6/ 6/78	JFK-SFO	372.	31	4:30	1:00		.079	.156	.272	.106	36	.173	.329	.548	14	.452	.218
6/ 6/78	SFO-HNL	354.	28	4:00			.022	.045	.105	.025	32	.063	.078	.098	0	---	---
6/ 7/78	HNL-ORD	351.	50	6:25	:20		.036	.073	.142	.058	53	.091	.149	.257	13	.276	.166
6/ 7/78	ORD-LAX	361.	19	2:40	:35		.082	.133	.193	---	25	.185	.316	.466	14	.487	.210
6/ 7/78	LAX-ITO	355.	24	4:00			.012	.031	.054	.011	33	.049	.062	.094	0	---	---
6/ 8/78	ITO-LAX	365.	16	3:36			.012	.032	.073	.015	30	.047	.068	.125	1	.000	---
6/ 8/78	LAX-ORD	359.	17	2:25	:35		.084	.144	.191	---	20	.221	.366	.421	11	.370	.117
6/ 8/78	ORD-JFK	350.	5	:40			.004	.011	.019	---	6	.058	.076	.104	1	.000	---

DATE	ROUTE	FL	CABIN OZONE							AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)		
			ND	HOURS:MIN TOTAL	>.1E	>.25E	PPMV MEAN	PPMV M+SD	PPMV MAX	PPMV 3HR	ND	PPMV MEAN	PPMV M+SD	PPMV MAX	ND	MEAN	SD
6/ 8/78	JFK-LAX	355.	25	3:40	:14		.037	.082	.176	.044	33	.168	.314	.602	17	.210	.192
6/ 8/78	LAX-HNL	353.	18	4:20			.012	.029	.055	.020	35	.057	.082	.138	3	.060	.085
6/ 9/78	HNL-LAX	335.	23	3:22			.024	.052	.103	.026	30	.040	.053	.083	0	---	---
6/10/78	LAX-JFK	362.	30	4:01			.028	.064	.119	.040	33	.063	.081	.153	1	.072	---
6/11/78	JFK-LAX	367.	25	3:59			.011	.025	.042	.015	33	.067	.088	.119	4	.111	.144
6/11/78	LAX-HNL	355.	32	3:50			.019	.037	.081	.023	33	.072	.116	.191	7	.259	.196
6/11/78	HNL-SFO	364.	26	3:35			.022	.045	.101	.026	29	.063	.098	.132	5	.284	.152
6/12/78	SFO-ORD	358.	17	2:20			.025	.051	.076	---	20	.070	.096	.137	2	.383	.172
6/13/78	ORD-JFK	357.	6	:40	:10		.098	.174	.200	---	6	.278	.485	.607	5	.291	.122
6/13/78	JFK-ORD	353.	6	:40	:20		.116	.187	.207	---	8	.401	.645	.669	6	.253	.166
6/13/78	ORD-SFO	367.	25	3:00			.037	.063	.110	.037	25	.100	.143	.205	11	.327	.125
6/13/78	SFO-JFK	380.	21	2:37			.060	.097	.115	---	29	.187	.329	.486	16	.270	.069
6/14/78	JFK-SFO	374.	40	4:54	:10		.052	.077	.139	.057	41	.121	.168	.309	22	.391	.207
6/14/78	SFO-HNL	358.	28	4:00			.024	.047	.082	.029	33	.071	.095	.111	6	.341	.236
6/15/78	HNL-ORD	355.	50	6:34			.021	.037	.072	.028	53	.081	.122	.261	13	.214	.098
6/15/78	ORD-DEN	361.	10	1:21			.021	.043	.075	---	11	.076	.100	.102	2	.202	.043
6/15/78	DEN-LAX	368.	9	1:10			.020	.041	.070	---	10	.080	.101	.119	1	.176	---
6/15/78	LAX-HNL	355.	36	4:40			.015	.035	.076	.018	38	.062	.084	.138	4	.342	.127
6/16/78	HNL-SFO	366.	20	2:30	:50		.110	.186	.243	---	26	.248	.437	.553	17	.387	.185
6/17/78	SFO-HNL	346.	31	3:50	:35		.042	.094	.156	.053	31	.173	.338	.555	14	.285	.076
6/17/78	HNL-SFO	362.	28	3:30	:35		.072	.137	.221	.084	28	.226	.386	.578	20	.290	.099
6/17/78	SFO-JFK	356.	27	3:35			.034	.062	.085	.038	29	.118	.212	.333	9	.291	.147
6/17/78	JFK-LAX	389.	26	4:20			.010	.022	.063	.011	34	.055	.075	.101	1	.257	---
6/18/78	LAX-ORD	359.	18	2:20			.019	.038	.069	---	19	.057	.083	.110	2	.531	.096
6/18/78	ORD-HNL	340.	50	7:11	:36		.043	.092	.206	.079	50	.140	.285	.571	17	.304	.188
6/19/78	HNL-SFO	365.	28	3:29			.036	.071	.109	.040	28	.105	.179	.302	8	.362	.235
6/20/78	JFK-ORD	327.	8	:51			.039	.079	.116	---	8	.130	.185	.222	4	.375	.361
6/20/78	ORD-HNL	333.	57	7:15	:15		.028	.060	.140	.052	60	.123	.210	.447	24	.197	.139
6/21/78	ITO-ORD	353.	48	6:08			.016	.042	.116	.017	50	.102	.189	.462	11	.157	.135
6/21/78	ORD-LAX	342.	21	2:50	:10		.028	.064	.147	---	22	.052	.067	.095	0	---	---
6/22/78	LAX-HNL	353.	32	4:00			.020	.039	.082	.020	36	.083	.117	.177	9	.204	.140
6/22/78	HNL-LAX	361.	23	3:35			.017	.039	.075	.021	29	.094	.140	.219	10	.213	.184
6/22/78	LAX-HNL	354.	30	4:20			.023	.040	.059	.025	38	.098	.137	.223	7	.193	.129
6/23/78	ITO-LAX	363.	20	3:00	:15		.060	.108	.150	.060	27	.092	.132	.219	6	.390	.424
VL0017	FILE 3	355.	2728	360:17	17:52		.041	.083	.308	.106	2726	.115	.223	.847	827	.337	.190

GASP CABIN AND AMBIENT OZONE DATA SUMMARY

AIRCRAFT: N4711U (B747-100)

TAPE VL0018, FILE 1

DATE	ROUTE	FL	CABIN OZONE							AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)		
				HOURS:MIN			PPMV				PPMV					
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD
6/23/78	LAX-JFK	377.	27	3:50	:10		.041	.073	.133	.043	32	.097	.174	.356	10	.366	.307
6/24/78	JFK-LAX	384.	27	4:22			.012	.032	.091	.017	33	.095	.184	.419	9	.191	.133
6/24/78	LAX-HNL	354.	37	4:45			.024	.045	.088	.025	39	.075	.089	.121	2	.229	.151
6/24/78	HNL-SFO	360.	26	3:20			.022	.041	.106	.024	27	.093	.126	.213	6	.353	.210
6/25/78	SFO-ORD	363.	22	3:07	:15		.053	.105	.244	.053	25	.106	.151	.225	7	.528	.587
6/26/78	ORD-JFK	374.	5	:35			.017	.027	.031	.017	5	.076	.091	.102	1	.167	---
6/26/78	JFK-ORD	294.	8	:55			.016	.025	.034	---	20	.069	.082	.100	0	---	---
6/26/78	ORD-SFO	375.	25	3:03	1:00		.085	.137	.203	.088	25	.212	.335	.483	18	.419	.090
6/26/78	SFO-JFK	362.	21	2:35			.044	.057	.073	---	29	.121	.177	.298	8	.429	.071
6/27/78	JFK-SFO	362.	36	4:40	:45		.071	.116	.233	.081	38	.163	.317	.620	22	.431	.174
6/27/78	SFO-HNL	356.	32	4:00			.037	.053	.086	.040	34	.087	.128	.215	14	.343	.141
6/28/78	HNL-ORD	345.	49	6:20	1:00		.052	.111	.247	.083	50	.130	.280	.567	12	.357	.097
6/28/78	ORD-DEN	367.	10	1:10			.022	.040	.056	---	11	.066	.075	.075	0	---	---
6/28/78	DEN-LAX	359.	10	1:10			.019	.036	.050	---	10	.095	.161	.298	3	.228	.061
6/28/78	LAX-HNL	355.	35	4:30			.021	.035	.070	.025	36	.071	.122	.212	8	.254	.128
6/29/78	ITO-ORD	343.	52	6:26	:05		.023	.049	.134	.036	52	.072	.125	.300	7	.450	.253
6/29/78	ORD-LAX	340.	20	2:30			.044	.069	.097	---	20	.080	.121	.182	5	.371	.131
6/30/78	LAX-HNL	353.	34	4:40			.024	.042	.075	.029	37	.045	.067	.120	1	.341	---
6/30/78	HNL-LAX	336.	24	3:10			.029	.046	.070	.029	26	.037	.055	.081	0	---	---
7/ 1/78	LAX-DEN	341.	9	1:00			.068	.093	.109	---	9	.072	.092	.095	0	---	---
7/ 1/78	DEN-ORD	347.	8	1:00			.016	.029	.034	---	10	.093	.111	.128	1	.265	---
7/ 1/78	ORD-HNL	347.	57	7:30	1:20		.075	.118	.173	.096	61	.215	.372	.560	33	.344	.174
7/ 2/78	HNL-ORD	340.	47	6:20	:05		.025	.049	.121	.030	50	.048	.084	.154	5	.391	.097
7/ 2/78	ORD-JFK	340.	6	:35			.010	.019	.026	---	7	.087	.095	.106	1	.066	---
7/ 2/78	JFK-LAX	373.	32	4:10			.034	.047	.062	.036	34	.071	.093	.103	4	.352	.144
7/ 2/78	LAX-HNL	346.	35	4:35	:10		.047	.068	.127	.050	37	.032	.044	.064	0	---	---
7/ 3/78	ITO-ORD	346.	47	6:10			.025	.049	.086	.039	50	.067	.135	.314	8	.335	.136
7/ 3/78	ORD-LAX	372.	21	2:50			.032	.048	.071	---	16	.095	.166	.229	4	.319	.073
7/ 4/78	LAX-HNL	346.	34	4:30			.006	.011	.026	.007	36	.026	.032	.052	0	---	---
7/ 4/78	HNL-SFO	361.	25	3:20			.036	.060	.098	.036	27	.059	.091	.108	3	.372	.339
7/ 5/78	SFO-HNL	357.	33	4:10			.025	.047	.073	.027	35	.072	.102	.163	5	.261	.123
7/ 5/78	HNL-LAX	362.	30	3:45			.021	.035	.060	.023	31	.036	.049	.082	0	---	---
7/ 6/78	LAX-DEN	314.	8	:56			.025	.041	.046	---	10	.167	.288	.393	2	.104	.009
7/ 6/78	DEN-ORD	360.	8	1:02			.001	.003	.005	---	11	.062	.082	.105	2	.024	.024
7/ 6/78	ORD-HNL	336.	53	7:00			.040	.066	.108	.057	58	.123	.214	.417	20	.316	.095
7/ 7/78	HNL-LAX	363.	30	3:50			.037	.055	.073	.038	32	.059	.078	.107	3	.329	.074
7/ 8/78	LAX-DEN	334.	8	1:01			.014	.023	.028	---	9	.047	.063	.075	0	---	---

GASP CABIN AND AMBIENT OZONE DATA SUMMARY

AIRCRAFT: N4711U (B747-100)

DATE	ROUTE	FL	CABIN OZONE							AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)		
				HOURS:MIN			PPMV				PPMV					
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD
7/ 8/78	DEN-ORD	351.	9	1:00			.015	.027	.036	---	8	.056	.072	.081	0	---	---
7/ 8/78	ORD-HNL	337.	56	7:25	:35		.051	.094	.200	.058	59	.104	.178	.426	18	.360	.185
7/ 9/78	HNL-SFO	362.	20	2:35			.036	.053	.072	---	21	.073	.118	.220	3	.354	.163
7/ 9/78	SFO-HNL	362.	32	4:00			.025	.036	.047	.025	32	.064	.095	.135	5	.250	.074
7/10/78	HNL-LAX	335.	27	3:50			.016	.029	.045	.016	32	.033	.043	.055	0	---	---
7/10/78	LAX-HNL	356.	34	4:10			.019	.028	.038	.021	33	.039	.051	.057	0	---	---
7/10/78	HNL-SFO	367.	25	3:30			.024	.043	.072	.026	27	.067	.112	.174	7	.316	.087
7/11/78	SFO-ORD	374.	17	2:35			.024	.042	.059	---	20	.064	.085	.124	1	.436	---
7/12/78	ORD-JFK	385.	6	:40	:35		.131	.183	.171	---	0	---	---	---	0	---	---
7/12/78	JFK-ORD	332.	8	:50			.017	.036	.072	---	8	.072	.079	.087	0	---	---
7/12/78	ORD-SFO	369.	20	2:40			.022	.036	.061	---	25	.062	.082	.107	2	.166	.025
7/13/78	SFO-JFK	369.	26	3:36	:10		.030	.062	.170	.033	28	.043	.060	.089	0	---	---
7/14/78	JFK-SFO	356.	34	4:35			.030	.046	.072	.035	33	.080	.120	.165	10	.274	.172
7/14/78	SFO-HNL	356.	30	4:10			.039	.057	.072	.043	33	.070	.125	.320	6	.392	.142
7/15/78	HNL-ORD	345.	47	6:20			.029	.041	.065	.030	49	.078	.122	.225	10	.279	.122
7/15/78	ORD-HNL	341.	58	7:25	:10		.028	.048	.134	.034	58	.058	.087	.134	5	.320	.094
7/16/78	HNL-SFO	363.	26	3:20			.033	.050	.083	.033	26	.067	.088	.109	1	.596	---
7/16/78	SFO-HNL	354.	28	3:50			.031	.053	.098	.037	24	.073	.086	.098	0	---	---
7/17/78	HNL-LAX	337.	30	3:45	:10		.033	.062	.166	.034	31	.051	.069	.099	0	---	---
7/17/78	LAX-JFK	374.	30	3:50			.020	.045	.106	.023	32	.104	.170	.295	13	.192	.120
7/17/78	JFK-ORD	344.	9	:56			.063	.090	.105	---	9	.251	.372	.437	7	.270	.112
7/17/78	ORD-HNL	339.	53	7:20			.036	.054	.102	.047	56	.066	.094	.118	8	.514	.087
7/18/78	ITO-ORD	334.	51	6:32			.033	.049	.071	.038	56	.068	.092	.125	6	.281	.092
7/18/78	ORD-LAX	349.	22	2:45			.049	.072	.111	---	22	.098	.117	.130	11	.463	.234
7/19/78	LAX-HNL	352.	33	4:10			.026	.046	.096	.027	34	.049	.069	.121	1	.531	---
7/19/78	HNL-LAX	362.	28	3:40			.018	.032	.044	.020	31	.051	.081	.136	4	.189	.086
7/19/78	LAX-HNL	352.	30	4:00			.030	.045	.057	.033	34	.049	.077	.136	2	.454	.079
7/20/78	ITO-LAX	345.	27	3:40			.020	.040	.073	.023	30	.060	.092	.130	4	.381	.235
7/20/78	LAX-JFK	360.	27	3:45			.044	.066	.084	.049	32	.110	.122	.143	21	.345	.170
7/21/78	JFK-LAX	367.	30	3:50			.050	.068	.094	.053	30	.111	.132	.141	23	.429	.141
7/21/78	LAX-HNL	352.	32	4:00	:10		.024	.047	.133	.024	33	.049	.081	.118	3	.388	.042
7/21/78	HNL-SFO	360.	25	3:40			.021	.040	.059	.025	29	.052	.083	.138	3	.395	.102
7/22/78	SFO-HNL	353.	30	3:50			.017	.035	.066	.020	32	.051	.085	.148	2	.336	.019
7/23/78	HNL-LAX	367.	21	2:50			.021	.036	.044	---	24	.055	.079	.090	0	---	---
7/23/78	LAX-JFK	373.	28	3:40			.026	.040	.066	.028	30	.091	.125	.142	12	.267	.116
7/23/78	JFK-ORD	354.	7	:45			.034	.061	.078	---	8	.114	.145	.145	4	.278	.150
7/23/78	ORD-HNL	356.	59	7:30	:05		.027	.049	.127	.037	59	.069	.113	.261	7	.324	.085
7/24/78	ITO-ORD	357.	47	6:30			.027	.049	.102	.039	52	.089	.155	.309	11	.298	.124
7/24/78	ORD-LAX	358.	21	2:40	:10		.044	.071	.140	---	20	.104	.119	.152	9	.474	.327
7/25/78	LAX-HNL	354.	30	4:00			.019	.038	.077	.023	34	.050	.086	.158	3	.102	.037

GASP CABIN AND AMBIENT OZONE DATA SUMMARY

AIRCRAFT: N4711U (B747-100)

DATE	ROUTE	FL	CABIN OZONE							AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)		
				HOURS:MIN			PPMV				PPMV					
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD
7/25/78	HNL-LAX	310.	27	3:49			.010	.024	.059	.012	31	.043	.065	.128	1	.282	---
7/25/78	LAX-HNL	315.	33	4:20			.009	.019	.038	.011	34	.050	.073	.110	3	.220	.112
7/26/78	HNL-LAX	355.	29	3:50			.013	.021	.030	.015	32	.054	.070	.097	0	---	---
7/26/78	LAX-HNL	357.	23	4:10			.004	.011	.028	.005	33	.053	.075	.092	0	---	---
7/26/78	HNL-SFO	362.	23	3:31			.005	.013	.028	.006	29	.059	.087	.139	2	.133	.104
7/27/78	SFO-JFK	363.	29	3:50			.025	.056	.116	.029	33	.092	.170	.300	6	.284	.117
7/28/78	JFK-SFO	373.	36	4:35			.011	.020	.038	.010	37	.086	.115	.220	6	.112	.077
7/28/78	SFO-HNL	354.	26	4:10			.005	.012	.022	.006	34	.053	.076	.115	2	.170	.039
7/29/78	HNL-ORD	345.	39	6:35			.004	.013	.041	.004	53	.052	.073	.113	0	---	---
7/29/78	ORD-DEN	366.	10	1:10			.005	.011	.015	---	10	.094	.101	.101	2	.075	.075
7/29/78	DEN-LAX	360.	10	1:10			.007	.014	.016	---	8	.080	.098	.097	0	---	---
7/29/78	LAX-HNL	346.	29	4:10			.014	.028	.054	.015	33	.045	.064	.101	1	.060	---
7/30/78	HNL-SFO	361.	28	3:30			.005	.014	.040	.006	26	.059	.076	.120	1	.116	---
7/31/78	SFO-HNL	370.	24	3:35			.003	.009	.021	.004	29	.053	.074	.085	0	---	---
7/31/78	HNL-SFO	365.	27	3:30			.006	.015	.048	.007	28	.054	.069	.073	0	---	---
7/31/78	SFO-JFK	365.	23	3:30			.031	.060	.087	.037	29	.124	.202	.342	9	.177	.108
8/ 1/78	JFK-LAX	376.	27	4:11			.022	.043	.074	.030	34	.105	.162	.279	7	.232	.078
8/ 1/78	LAX-JFK	358.	28	3:35			.018	.027	.034	.019	28	.078	.091	.112	1	.071	---
8/ 2/78	JFK-LAX	372.	31	4:00			.029	.038	.060	.029	34	.079	.092	.106	1	.273	---
8/ 2/78	LAX-HNL	354.	33	4:10			.020	.032	.064	.022	34	.056	.082	.104	2	.290	.088
8/ 2/78	HNL-SFO	363.	26	3:30			.032	.052	.072	.037	27	.062	.089	.118	2	.378	.132
8/ 3/78	SFO-HNL	356.	33	4:00			.026	.040	.090	.029	33	.062	.081	.091	0	---	---
8/ 4/78	HNL-LAX	334.	32	3:50			.025	.039	.062	.029	32	.054	.073	.098	0	---	---
8/ 4/78	LAX-ORD	372.	11	1:20			.035	.051	.065	---	19	.101	.121	.134	9	.316	.115
8/ 4/78	ORD-HNL	371.	56	7:20			.030	.045	.065	.033	57	.090	.128	.217	18	.309	.100
8/ 5/78	HNL-ORD	350.	53	6:45	:05		.033	.055	.171	.040	54	.075	.118	.261	10	.269	.090
8/ 5/78	ORD-JFK	347.	7	:45			.030	.043	.062	---	7	.089	.096	.095	0	---	---
8/ 5/78	JFK-LAX	363.	25	3:00			.045	.067	.094	.045	33	.110	.171	.276	10	.326	.087
8/ 5/78	LAX-HNL	354.	30	4:00			.022	.032	.055	.024	33	.059	.080	.110	1	.282	---
8/ 6/78	HNL-SFO	363.	28	3:40			.023	.030	.038	.024	30	.065	.087	.109	3	.277	.047
8/ 6/78	SFO-JFK	355.	21	3:26			.030	.044	.057	.033	35	.089	.129	.289	7	.281	.118
8/ 6/78	JFK-SFO	380.	32	4:20			.038	.054	.077	.042	34	.095	.128	.160	12	.344	.126
8/ 7/78	SFO-HNL	353.	33	4:01	:06		.053	.076	.124	.057	33	.058	.077	.135	1	.355	---
8/ 8/78	HNL-LAX	330.	22	2:50			.027	.036	.048	---	31	.041	.055	.109	1	.183	---
8/ 9/78	LAX-HNL	351.	34	4:10			.039	.046	.052	.041	34	.042	.051	.062	0	---	---
8/ 9/78	HNL-SFO	358.	29	3:40			.040	.055	.081	.044	28	.042	.055	.080	0	---	---
VL0018	FILE 1	354.3	171	418:50	7:06		.029	.056	.247	.096	3435	.076	.138	.620	564	.328	.181

GASP CABIN AND AMBIENT OZONE DATA SUMMARY

AIRCRAFT: N4711U (B747-100)

TAPE VL0018, FILE 2

DATE	ROUTE	FL	CABIN OZONE							AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)		
				HOURS:MIN			PPMV				PPMV					
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD
8/11/78	SFO-JFK	371.	30	3:40			.066	.085	.114	.066	28	.051	.069	.089	0	---	---
8/12/78	JFK-ORD	356.	8	:50			.042	.051	.060	---	8	.047	.054	.058	0	---	---
8/12/78	ORD-SFO	363.	24	2:50			.048	.060	.068	---	24	.048	.056	.063	0	---	---
8/12/78	SFO-JFK	370.	33	3:58			.054	.075	.121	.058	33	.060	.079	.109	1	1.108	---
8/13/78	JFK-SFO	375.	31	4:11	:05		.064	.090	.135	.064	36	.058	.078	.106	1	.706	---
8/13/78	SFO-JFK	363.	28	3:52			.056	.077	.105	.052	32	.061	.076	.099	0	---	---
8/14/78	JFK-ORD	335.	7	:48			.061	.077	.087	---	6	.064	.074	.078	0	---	---
8/14/78	ORD-SFO	364.	35	2:54	:20		.067	.103	.154	---	40	.058	.086	.120	4	1.261	.059
8/14/78	SFO-JFK	364.	30	3:50	:30		.083	.132	.280	.092	23	.061	.076	.086	0	---	---
8/15/78	ORD-SFO	363.	27	3:16			.050	.064	.076	.052	26	.049	.059	.080	0	---	---
8/15/78	SFO-ORD	361.	19	2:30			.045	.060	.079	---	21	.043	.052	.056	0	---	---
8/16/78	ORD-JFK	375.	5	:40			.050	.063	.064	---	5	.063	.069	.073	0	---	---
8/16/78	JFK-ORD	343.	8	:50			.042	.052	.057	---	7	.055	.063	.081	0	---	---
8/16/78	ORD-SFO	370.	23	3:10			.054	.068	.079	.055	25	.077	.096	.113	3	.555	.160
8/18/78	ORD-SFO	377.	7	:45			.051	.065	.070	---	7	.133	.154	.162	6	.405	.123
9/15/78	JFK-SFO	382.	36	4:45			.061	.087	.108	.068	0	---	---	---	0	---	---
9/15/78	SFO-HNL	352.	31	3:45			.036	.048	.064	.037	31	.030	.042	.065	0	---	---
9/16/78	HNL-ORD	355.	79	6:30			.029	.041	.081	.030	81	.032	.047	.087	0	---	---
9/16/78	ORD-DEN	367.	11	1:25			.031	.042	.049	---	10	.024	.038	.042	0	---	---
9/16/78	DEN-LAX	359.	10	1:10			.044	.066	.107	---	10	.071	.138	.211	3	.459	.171
9/16/78	LAX-HNL	342.	34	4:04	:30		.067	.114	.218	.078	34	.030	.041	.045	0	---	---
9/17/78	HNL-LAX	370.	31	4:06			.022	.030	.042	.023	31	.034	.043	.047	0	---	---
9/17/78	LAX-HNL	353.	34	4:09			.035	.054	.083	.038	34	.041	.053	.088	0	---	---
9/18/78	ITO-LAX	365.	31	3:50			.029	.051	.122	.031	30	.031	.045	.053	0	---	---
9/18/78	LAX-ORD	354.	17	2:15			.042	.058	.080	---	17	.044	.062	.070	0	---	---
9/19/78	DTW-ORD	214.	1	:00			.022	---	.022	---	1	.015	---	.015	0	---	---
9/19/78	ORD-HNL	344.	56	7:25			.030	.055	.091	.044	55	.063	.135	.290	7	.329	.081
9/21/78	SFO-ORD	349.	21	2:31			.028	.043	.078	---	21	.077	.115	.158	5	.246	.052
9/22/78	ORD-JFK	339.	4	:40			.042	.049	.054	---	7	.077	.090	.090	0	---	---
9/22/78	JFK-ORD	320.	2	:06			.046	.054	.054	---	2	.123	.148	.148	1	.365	---
9/22/78	ORD-SFO	376.	24	3:05			.039	.059	.095	.040	23	.075	.119	.171	7	.373	.085
9/22/78	SFO-JFK	380.	30	3:45			.012	.023	.046	.014	31	.080	.140	.263	7	.178	.039
9/23/78	JFK-SFO	370.	32	4:23			.016	.027	.040	.017	33	.052	.070	.090	0	---	---

DATE	ROUTE	FL	CABIN OZONE								AMBIENT OZONE				CABIN/AMBIENT (FOR AMB >.1)		
				HOURS:MIN			PPMV					PPMV					
			ND	TOTAL	>.1E	>.25E	MEAN	M+SD	MAX	3HR	ND	MEAN	M+SD	MAX	ND	MEAN	SD
9/23/78	SFO-ORD	355.	21	2:40			.032	.054	.108	---	21	.038	.045	.051	0	---	---
9/24/78	ORD-JFK	347.	5	:35			.014	.019	.026	---	5	.049	.059	.066	0	---	---
9/24/78	JFK-SFO	372.	26	3:05			.028	.048	.087	.028	25	.081	.124	.179	8	.298	.207
9/24/78	SFO-HNL	352.	32	4:20			.021	.035	.066	.023	33	.045	.066	.089	0	---	---
9/25/78	HNL-ORD	344.	49	6:30			.020	.038	.093	.025	50	.051	.077	.128	3	.042	.059
9/25/78	ORD-HNL	349.	39	4:49			.030	.050	.073	.035	37	.032	.050	.072	0	---	---
9/26/78	HNL-LAX	359.	27	3:44			.014	.033	.090	.014	29	.029	.037	.050	0	---	---
9/26/78	LAX-HNL	353.	37	4:41			.026	.045	.064	.025	37	.028	.037	.049	0	---	---
9/27/78	HNL-LAX	361.	27	3:29			.024	.046	.067	.027	28	.034	.045	.058	0	---	---
9/27/78	LAX-ORD	352.	21	2:40			.026	.044	.065	---	21	.059	.084	.113	3	.311	.078
9/28/78	ORD-HNL	343.	61	7:30			.019	.032	.062	.021	60	.042	.055	.090	0	---	---
9/29/78	HNL-ORD	350.	49	6:30			.022	.037	.074	.026	52	.052	.076	.110	7	.286	.191
9/29/78	ORD-YYZ	315.	2	:10			.002	.005	.005	---	2	.055	.059	.059	0	---	---
9/29/78	YYZ-ORD	295.	3	:15			.036	.047	.050	---	3	.054	.056	.059	0	---	---
9/29/78	ORD-HNL	360.	54	7:35			.019	.040	.107	.027	59	.062	.090	.133	7	.124	.045
9/30/78	HNL-LAX	356.	31	3:53			.027	.042	.069	.029	31	.056	.071	.085	0	---	---
10/ 1/78	LAX-DEN	329.	1	:00			.011	---	.011	---	1	.048	---	.048	0	---	---
10/ 1/78	DEN-ORD	365.	8	1:10			.037	.050	.056	---	8	.095	.128	.130	5	.344	.022
10/ 1/78	ORD-HNL	338.	49	7:05			.030	.054	.101	.037	53	.053	.074	.116	4	.510	.116
10/ 2/78	HNL-ORD	347.	52	6:52			.018	.034	.103	.020	53	.063	.093	.122	12	.143	.130
10/ 2/78	ORD-YYZ	299.	2	:10			.005	.011	.011	---	2	.043	.044	.044	0	---	---
10/ 2/78	YYZ-ORD	311.	2	:20			.002	.005	.005	---	3	.046	.048	.048	0	---	---
10/ 2/78	ORD-HNL	339.	58	7:34	:05		.035	.061	.126	.051	59	.066	.113	.275	10	.372	.145
10/ 3/78	HNL-SFO	359.	29	3:46			.019	.031	.050	.022	30	.063	.084	.097	0	---	---
10/ 4/78	SFO-HNL	354.	30	3:50			.020	.036	.055	.023	31	.055	.076	.116	1	.293	---
10/ 4/78	HNL-LAX	325.	33	4:00			.020	.032	.046	.022	32	.042	.056	.100	1	.390	---
10/ 5/78	LAX-DEN	348.	9	1:10			.012	.022	.036	---	9	.059	.077	.090	0	---	---
10/ 5/78	DEN-ORD	352.	9	1:00			.052	.065	.076	---	9	.210	.265	.285	8	.233	.042
10/ 5/78	ORD-DEN	371.	11	1:20			.061	.082	.105	---	11	.204	.274	.303	10	.309	.085
10/ 5/78	DEN-LAX	372.	9	1:00			.026	.048	.084	---	9	.046	.072	.118	1	.712	---
10/ 5/78	LAX-HNL	353.	35	4:20			.027	.048	.098	.029	27	.050	.067	.097	0	---	---
10/ 6/78	HNL-SFO	362.	39	3:53			.016	.030	.064	.017	34	.048	.062	.075	0	---	---
VL0018	FILE 2	355.1659	205:54		1:30		.033	.060	.280	.092	1636	.054	.090	.303	125	.336	.247

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16. Abstract

Measurements of ozone concentrations at cruise altitudes both outside and in the cabin of a Boeing 747SP and Boeing 747-100 airliners in routine commericial service are presented in this series of reports. Plotted and tabulated data are identified by route and are arranged chronologically for each airplane. These data were taken at 5- or 10-minute intervals by automated instrumentation used in the NASA Global Atmospheric Samping Program (GASP). All GASP cabin ozone data obtained from January to early October 1978 are presented in this volume.

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